

FCC Test Report

(PART 24)

Report No.: RF190610D15-1

FCC ID: P27NA502S4G

Test Model: NA502S-4G

Series Model: NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marketing purpose)

Received Date: Jun. 10, 2019

Test Date: Jun. 18, 2019 ~ Jun. 27, 2019

Issued Date: Jul. 09, 2019

Applicant: Sercomm Corp.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Test Location (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)

**FCC Registration /
Designation Number:** 788550 / TW0003

Test Location (2): B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C

**FCC Registration /
Designation Number:** 427177 / TW0011



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Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Test Site and Instruments	7
3 General Information	8
3.1 General Description of EUT	8
3.2 Configuration of System under Test	10
3.2.1 Description of Support Units	10
3.3 Test Mode Applicability and Tested Channel Detail	11
3.4 EUT Operating Conditions	13
3.5 General Description of Applied Standards	13
4 Test Types and Results	14
4.1 Output Power Measurement	14
4.1.1 Limits of Output Power Measurement	14
4.1.2 Test Procedures	14
4.1.3 Test Setup	15
4.1.4 Test Results	16
4.2 Modulation Characteristics Measurement	22
4.2.1 Limits of Modulation Characteristics	22
4.2.2 Test Setup	22
4.2.3 Test Procedure	22
4.2.4 Test Results	23
4.3 Frequency Stability Measurement	24
4.3.1 Limits of Frequency Stability Measurement	24
4.3.2 Test Procedure	24
4.3.3 Test Setup	24
4.3.4 Test Results	25
4.4 Occupied Bandwidth Measurement	32
4.4.1 Test Procedure	32
4.4.2 Test Setup	32
4.4.3 Test Result	33
4.5 Band Edge Measurement	37
4.5.1 Limits of Band Edge Measurement	37
4.5.2 Test Setup	37
4.5.3 Test Procedures	37
4.5.4 Test Results	38
4.6 Peak to Average Ratio	44
4.6.1 Limits of Peak to Average Ratio Measurement	44
4.6.2 Test Setup	44
4.6.3 Test Procedures	44
4.6.4 Test Results	45
4.7 Conducted Spurious Emissions	49
4.7.1 Limits of Conducted Spurious Emissions Measurement	49
4.7.2 Test Setup	49
4.7.3 Test Procedure	49
4.7.4 Test Results	50
4.8 Radiated Emission Measurement	57
4.8.1 Limits of Radiated Emission Measurement	57
4.8.2 Test Procedure	57
4.8.3 Deviation from Test Standard	57
4.8.4 Test Setup	58
4.8.5 Test Results	59

5 Pictures of Test Arrangements	83
Appendix – Information of the Testing Laboratories	84

Release Control Record

Issue No.	Description	Date Issued
RF190610D15-1	Original Release	Jul. 09, 2019

1 Certificate of Conformity

Product: Multiple RF Home Gateway

Brand: Sercomm, Scout

Test Model: NA502S-4G

Series Model: NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marketing purpose)

Sample Status: Engineering Sample

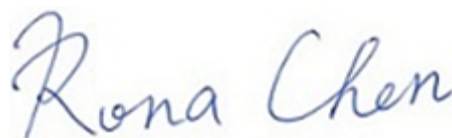
Applicant: Sercomm Corp.

Test Date: Jun. 18, 2019 ~ Jun. 27, 2019

Standards: FCC Part 24, Subpart E

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :



, Date:

Jul. 09, 2019

Rona Chen / Specialist

Approved by :



, Date:

Jul. 09, 2019

Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -22.96 dB at 7520 MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.0400 dB
	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Aug. 20, 2018	Aug. 19, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSW26	102023	Oct. 11, 2018	Oct. 10, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-616	Nov. 27, 2018	Nov. 26, 2019
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA9170	9170-480	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 25, 2018	Nov. 24, 2019
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 19, 2018	Nov. 18, 2019
Preamplifier Agilent	310N	187226	Jun. 18, 2019	Jun. 17, 2020
Preamplifier Agilent	83017A	MY39501357	Jun. 18, 2019	Jun. 17, 2020
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC -SMS-100-SMS-12 0+RFC-SMS-100-S MS-400)	Jun. 18, 2019	Jun. 17, 2020
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC -SMS-100-SMS-24)	Jun. 18, 2019	Jun. 17, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jun. 28, 2017	Jun. 27, 2019
LTE Wireless Communication Test Set Keysight	E7515A	MY57270629	Feb. 22, 2019	Feb. 21, 2020
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019
DC Power Supply Topward	33010D	807748	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.

3 General Information

3.1 General Description of EUT

Product	Multiple RF Home Gateway	
Brand	Sercomm, Scout	
Test Model	NA502S-4G	
Series Model	NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marketing purpose)	
Status of EUT	Engineering Sample	
Power Supply Rating	12.0 Vdc (Adapter) 7.5 Vdc (Li-ion battery)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	1852.4 ~ 1907.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	WCDMA	305.49 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	285.76 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	288.40 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	291.07 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	293.76 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	293.09 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	299.23 mW
Emission Designator	WCDMA	4M08F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09D7W
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49D7W
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M98D7W
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	18M0D7W
Antenna Type	PIFA Antenna with 3.76 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	N/A	

Note:

1. The EUT contains following accessory devices.

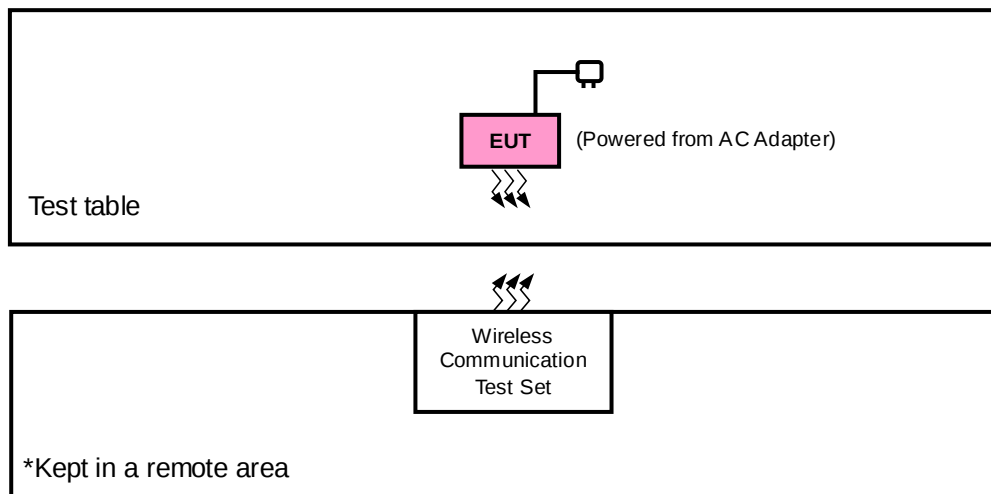
Product	Brand	Model	Description
Adapter 1	LEADER	MU24-Y120200-A1	I/P: 100-240 Vac, 50-60 Hz, 0.7 A O/P: 12.0 Vdc, 2 A 1.5m DC cable without core
Adapter 2	APD	WA-24Q12FU	I/P: 100-240 Vac, 50-60 Hz, 0.7 A O/P: 12.0 Vdc, 2 A 1.5m DC cable without core
Battery	Simplo	NA50X	Rating: 7.5 Vdc, 18 Wh Capacity: 2500 mAh

* We had pre-test on Adapter 1 and Adapter 2. The worst case was found on Adapter 1. Therefore, only Adapter 1 was as representative for final test.

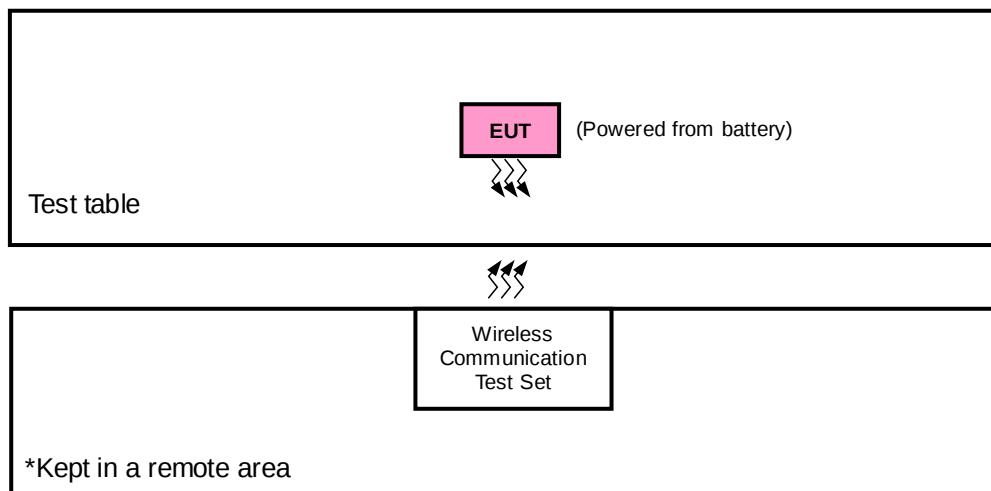
2. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.I.R.P. Test>



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, and antenna ports.

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission
WCDMA	X-plane	X- plane
LTE Band 2	X-plane	X- plane

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	Modulation Characteristics	9262 to 9538	9400	WCDMA
-	Frequency Stability	9262 to 9538	9262, 9538	WCDMA
-	Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
-	Band Edge	9262 to 9538	9262, 9538	WCDMA
-	Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
-	Conducted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission	9262 to 9538	9262, 9400, 9538	WCDMA

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset

-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			19185	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			19175	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			19150	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			19125	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			19100	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	Conducted Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	7.5 Vdc	Karl Lee
Modulation Characteristics	26 deg. C, 58 % RH	7.5 Vdc	Gavin Wu
Frequency Stability	26 deg. C, 58 % RH	7.5 Vdc	Gavin Wu
Occupied Bandwidth	26 deg. C, 58 % RH	7.5 Vdc	Gavin Wu
Band Edge	26 deg. C, 58 % RH	7.5 Vdc	Gavin Wu
Peak to Average Ratio	26 deg. C, 58 % RH	7.5 Vdc	Gavin Wu
Conducted Emission	26 deg. C, 58 % RH	7.5 Vdc	Gavin Wu
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 24

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for WCDMA and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

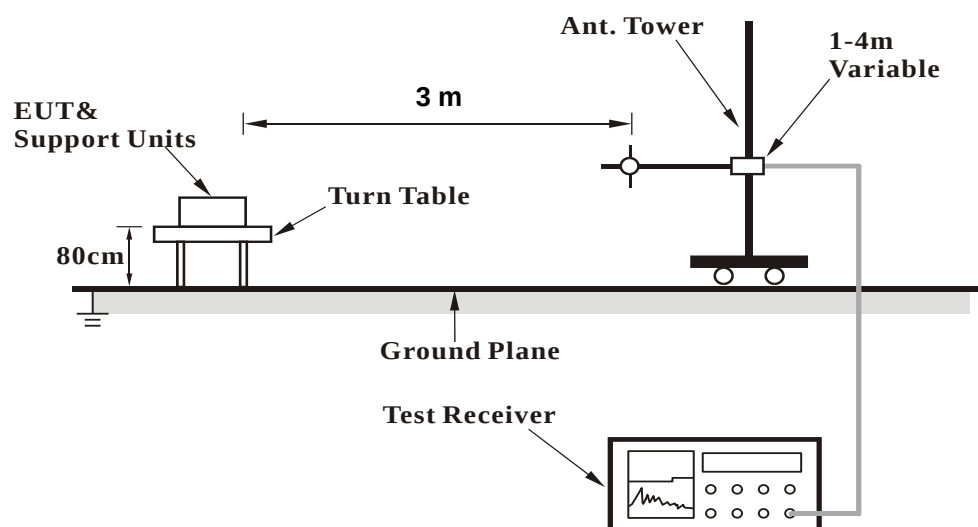
Conducted Power Measurement:

The EUT was set up for the maximum power with WCDMA and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

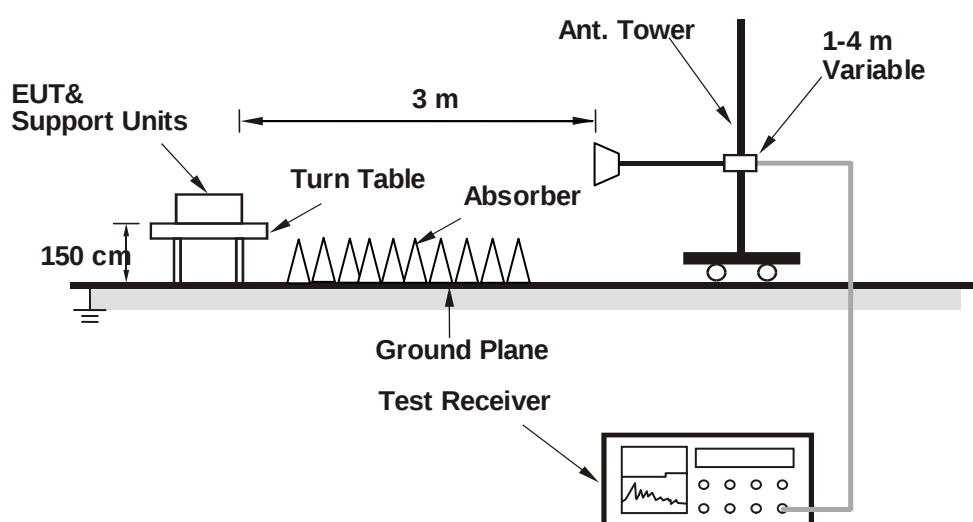
4.1.3 Test Setup

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

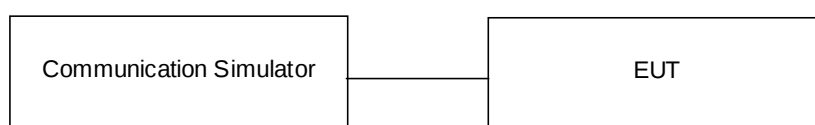


<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:



4.1.4 Test Results

Conducted Output Power (dBm)

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	23.53	23.48	23.49

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18607	Mid Ch 18900	High Ch 19193		Low Ch 18607	Mid Ch 18900	High Ch 19193	
			1850.7 MHz	1880.0 MHz	1909.3 MHz		1850.7 MHz	1880.0 MHz	1909.3 MHz	
2 / 1.4M	1	0	22.55	22.48	22.43	0	21.52	21.42	21.47	1
	1	2	22.50	22.42	22.40	0	21.43	21.33	21.43	1
	1	5	22.46	22.38	22.34	0	21.39	21.26	21.36	1
	3	0	22.40	22.30	22.28	0	21.31	21.25	21.29	1
	3	1	22.35	22.23	22.20	0	21.24	21.14	21.25	1
	3	3	22.28	22.19	22.14	0	21.20	21.04	21.17	1
	6	0	21.47	21.30	21.30	1	20.28	20.32	20.18	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18615	Mid Ch 18900	High Ch 19185		Low Ch 18615	Mid Ch 18900	High Ch 19185	
			1851.5 MHz	1880.0 MHz	1908.5 MHz		1851.5 MHz	1880.0 MHz	1908.5 MHz	
2 / 3M	1	0	22.58	22.51	22.48	0	21.54	21.47	21.42	1
	1	7	22.43	22.44	22.38	0	21.32	21.31	21.26	1
	1	14	22.30	22.25	22.12	0	21.31	21.22	21.14	1
	8	0	21.45	21.47	21.35	1	20.34	20.29	20.25	2
	8	3	21.28	21.24	21.21	1	20.25	20.12	20.08	2
	8	7	21.31	21.08	21.13	1	20.15	20.05	20.08	2
	15	0	21.42	21.32	21.33	1	20.37	20.28	20.34	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18625	Mid Ch 18900	High Ch 19175		Low Ch 18625	Mid Ch 18900	High Ch 19175	
			1852.5 MHz	1880.0 MHz	1907.5 MHz		1852.5 MHz	1880.0 MHz	1907.5 MHz	
2 / 5M	1	0	22.64	22.58	22.53	0	21.61	21.51	21.53	1
	1	12	22.51	22.36	22.39	0	21.46	21.39	21.43	1
	1	24	22.23	22.29	22.36	0	21.20	21.33	21.23	1
	12	0	21.50	21.37	21.44	1	20.40	20.34	20.42	2
	12	6	21.25	21.30	21.17	1	20.28	20.22	20.16	2
	12	13	21.26	21.19	21.15	1	20.23	20.21	20.07	2
	25	0	21.53	21.51	21.40	1	20.48	20.44	20.41	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18650	Mid Ch 18900	High Ch 19150		Low Ch 18650	Mid Ch 18900	High Ch 19150	
			1855.0 MHz	1880.0 MHz	1905.0 MHz		1855.0 MHz	1880.0 MHz	1905.0 MHz	
2 / 10M	1	0	22.66	22.58	22.57	0	21.65	21.56	21.59	1
	1	24	22.56	22.50	22.45	0	21.49	21.50	21.47	1
	1	49	22.34	22.37	22.34	0	21.40	21.24	21.35	1
	25	0	21.55	21.55	21.52	1	20.52	20.47	20.30	2
	25	12	21.38	21.30	21.29	1	20.31	20.23	20.23	2
	25	25	21.30	21.23	21.29	1	20.19	20.18	20.10	2
	50	0	21.53	21.43	21.44	1	20.48	20.41	20.39	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18675	Mid Ch 18900	High Ch 19125		Low Ch 18675	Mid Ch 18900	High Ch 19125	
			1857.5 MHz	1880.0 MHz	1902.5 MHz		1857.5 MHz	1880.0 MHz	1902.5 MHz	
2 / 15M	1	0	22.71	22.67	22.68	0	21.67	21.57	21.63	1
	1	37	22.65	22.56	22.51	0	21.53	21.51	21.47	1
	1	74	22.41	22.35	22.31	0	21.30	21.21	21.39	1
	36	0	21.57	21.59	21.54	1	20.56	20.35	20.48	2
	36	19	21.41	21.37	21.35	1	20.35	20.36	20.31	2
	36	39	21.27	21.29	21.24	1	20.22	20.23	20.23	2
	75	0	21.57	21.43	21.50	1	20.50	20.49	20.45	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18700	Mid Ch 18900	High Ch 19100		Low Ch 18700	Mid Ch 18900	High Ch 19100	
			1860.0 MHz	1880.0 MHz	1900.0 MHz		1860.0 MHz	1880.0 MHz	1900.0 MHz	
2 / 20M	1	0	22.79	22.73	22.71	0	21.74	21.69	21.70	1
	1	50	22.65	22.59	22.58	0	21.63	21.60	21.57	1
	1	99	22.55	22.36	22.40	0	21.45	21.43	21.42	1
	50	0	21.67	21.64	21.62	1	20.48	20.40	20.49	2
	50	25	21.46	21.45	21.43	1	20.34	20.40	20.33	2
	50	50	21.33	21.31	21.31	1	20.34	20.22	20.27	2
	100	0	21.60	21.60	21.58	1	20.56	20.50	20.56	2

EIRP Power (dBm)

WCDMA							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	9262	1852.4	-13.56	38.19	24.63	290.40	H
	9400	1880.0	-13.85	38.70	24.85	305.49	
	9538	1907.6	-14.85	39.35	24.50	281.84	
	9262	1852.4	-21.95	38.48	16.53	44.98	V
	9400	1880.0	-22.12	38.59	16.47	44.36	
	9538	1907.6	-22.38	38.87	16.49	44.57	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18607	1850.7	-20.14	44.70	24.56	285.76	H
	18900	1880.0	-20.18	44.70	24.52	283.14	
	19193	1909.3	-20.10	44.57	24.47	280.09	
	18607	1850.7	-28.62	44.27	15.65	36.73	V
	18900	1880.0	-29.31	44.87	15.56	35.97	
	19193	1909.3	-29.13	44.61	15.48	35.34	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	18607	1850.7	-21.14	44.70	23.56	226.99	H
	18900	1880.0	-21.19	44.70	23.51	224.39	
	19193	1909.3	-21.11	44.57	23.46	221.97	
	18607	1850.7	-29.62	44.27	14.65	29.17	V
	18900	1880.0	-30.31	44.87	14.56	28.58	
	19193	1909.3	-30.13	44.61	14.48	28.07	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18615	1851.5	-20.10	44.70	24.60	288.40	H
	18900	1880.0	-20.15	44.70	24.55	285.10	
	19185	1908.5	-20.06	44.57	24.51	282.68	
	18615	1851.5	-28.58	44.27	15.69	37.07	V
	18900	1880.0	-29.27	44.87	15.60	36.31	
	19185	1908.5	-29.09	44.61	15.52	35.67	
Channel Bandwidth: 3 MHz / 16QAM							
X	18615	1851.5	-21.11	44.70	23.59	228.56	H
	18900	1880.0	-21.15	44.70	23.55	226.46	
	19185	1908.5	-21.06	44.57	23.51	224.54	
	18615	1851.5	-29.59	44.27	14.68	29.38	V
	18900	1880.0	-30.28	44.87	14.59	28.77	
	19185	1908.5	-30.09	44.61	14.52	28.33	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18625	1852.5	-20.06	44.70	24.64	291.07	H
	18900	1880.0	-20.11	44.70	24.59	287.74	
	19175	1907.5	-20.03	44.57	24.54	284.64	
	18625	1852.5	-28.54	44.27	15.73	37.41	V
	18900	1880.0	-29.23	44.87	15.64	36.64	
	19175	1907.5	-29.05	44.61	15.56	36.00	
Channel Bandwidth: 5 MHz / 16QAM							
X	18625	1852.5	-21.07	44.70	23.63	230.67	H
	18900	1880.0	-21.11	44.70	23.59	228.56	
	19175	1907.5	-21.04	44.57	23.53	225.58	
	18625	1852.5	-29.55	44.27	14.72	29.65	V
	18900	1880.0	-30.24	44.87	14.63	29.04	
	19175	1907.5	-30.06	44.61	14.55	28.53	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18650	1855.0	-20.02	44.70	24.68	293.76	H
	18900	1880.0	-20.07	44.70	24.63	290.40	
	19150	1905.0	-20.99	44.57	23.58	228.19	
	18650	1855.0	-28.50	44.27	15.77	37.76	V
	18900	1880.0	-29.20	44.87	15.67	36.90	
	19150	1905.0	-29.01	44.61	15.60	36.33	
Channel Bandwidth: 10 MHz / 16QAM							
X	18650	1855.0	-21.03	44.70	23.67	232.81	H
	18900	1880.0	-21.08	44.70	23.62	230.14	
	19150	1905.0	-21.99	44.57	22.58	181.26	
	18650	1855.0	-29.51	44.27	14.76	29.92	V
	18900	1880.0	-30.20	44.87	14.67	29.31	
	19150	1905.0	-30.02	44.61	14.59	28.79	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18675	1857.5	-20.98	44.70	23.72	235.50	H
	18900	1880.0	-20.03	44.70	24.67	293.09	
	19125	1902.5	-20.95	44.57	23.62	230.30	
	18675	1857.5	-28.46	44.27	15.81	38.11	V
	18900	1880.0	-29.16	44.87	15.71	37.24	
	19125	1902.5	-28.98	44.61	15.63	36.58	
Channel Bandwidth: 15 MHz / 16QAM							
X	18675	1857.5	-21.98	44.70	22.72	187.07	H
	18900	1880.0	-21.03	44.70	23.67	232.81	
	19125	1902.5	-21.96	44.57	22.61	182.52	
	18675	1857.5	-29.46	44.27	14.81	30.27	V
	18900	1880.0	-30.17	44.87	14.70	29.51	
	19125	1902.5	-29.98	44.61	14.63	29.06	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18700	1860.0	-19.94	44.70	24.76	299.23	H
	18900	1880.0	-19.98	44.70	24.72	296.48	
	19100	1900.0	-20.92	44.57	23.65	231.90	
	18700	1860.0	-28.46	44.27	15.81	38.11	V
	18900	1880.0	-29.12	44.87	15.75	37.58	
	19100	1900.0	-28.94	44.61	15.67	36.92	
Channel Bandwidth: 20 MHz / 16QAM							
X	18700	1860.0	-20.94	44.70	23.76	237.68	H
	18900	1880.0	-20.91	44.70	23.79	239.33	
	19100	1900.0	-20.93	44.57	23.64	231.37	
	18700	1860.0	-29.46	44.27	14.81	30.27	V
	18900	1880.0	-30.13	44.87	14.74	29.79	
	19100	1900.0	-29.95	44.61	14.66	29.26	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

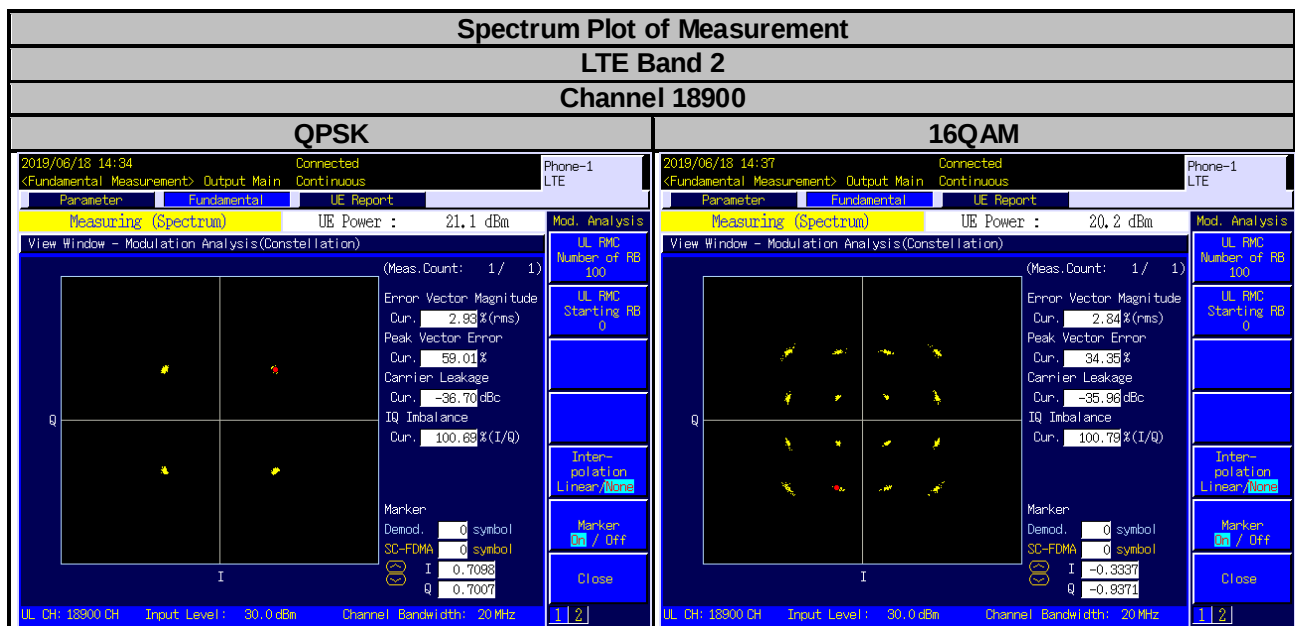
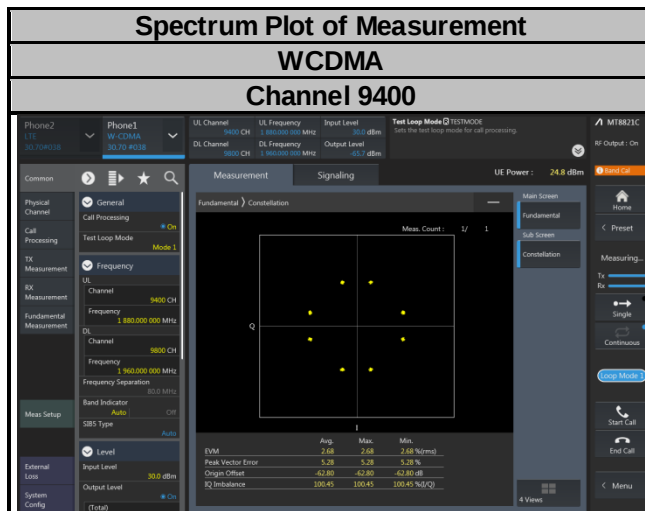
4.2.2 Test Setup



4.2.3 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.4 Test Results



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

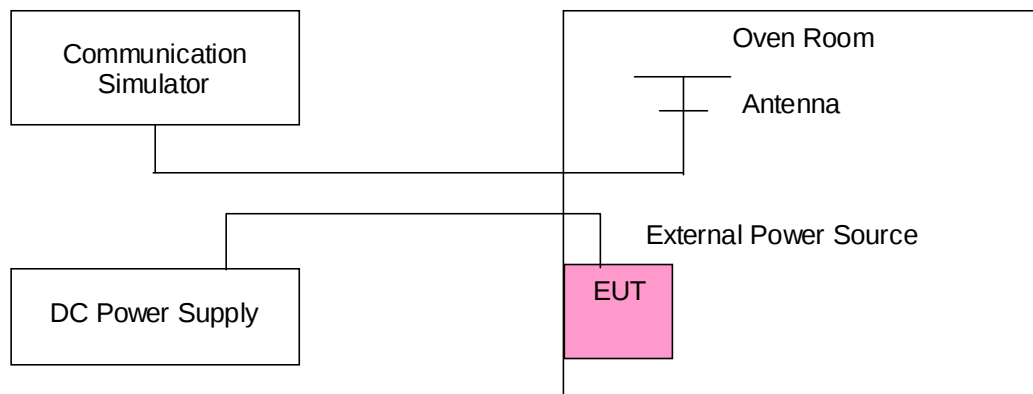
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.3.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1852.400003	0.001	1907.600004	0.002
6.375	1852.400003	0.002	1907.600002	0.001
8.63	1852.400001	0.001	1907.600004	0.002

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1852.400002	0.001	1907.600004	0.002
10	1852.400003	0.001	1907.600001	0.001
20	1852.400003	0.002	1907.600001	0.001
30	1852.400003	0.001	1907.600001	0.001
40	1852.400002	0.001	1907.600001	0.001

Note:

1. The applicant declared that the normal operating temperature of the EUT is from 0°C to 40°C.
2. The EUT would shut down automatically as below 0°C.

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1850.700002	0.001	1909.300000	0.000
6.375	1850.700002	0.001	1909.300000	0.000
8.63	1850.700002	0.001	1909.300000	0.000

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1850.700002	0.001	1909.300001	0.001
10	1850.700002	0.001	1909.300003	0.002
20	1850.699997	-0.001	1909.299998	-0.001
30	1850.699996	-0.002	1909.299997	-0.002
40	1850.699998	-0.001	1909.299997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1850.700003	0.001	1909.300000	0.001
6.375	1850.700002	0.001	1909.300003	0.001
8.63	1850.700004	0.002	1909.300004	0.002

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1850.700001	0.001	1909.300004	0.002
10	1850.700001	0.001	1909.300002	0.001
20	1850.699996	-0.002	1909.299997	-0.002
30	1850.699997	-0.002	1909.299999	-0.001
40	1850.699999	-0.001	1909.299996	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1850.700003	0.002	1909.300000	0.002
6.375	1850.700003	0.002	1909.300004	0.002
8.63	1850.700002	0.001	1909.300003	0.002

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1850.700003	0.002	1909.300002	0.001
10	1850.700003	0.002	1909.300003	0.002
20	1850.699997	-0.002	1909.299999	-0.001
30	1850.699996	-0.002	1909.299998	-0.001
40	1850.699999	-0.001	1909.299997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1850.700004	0.002	1909.300000	0.001
6.375	1850.700001	0.001	1909.300003	0.002
8.63	1850.700001	0.001	1909.300004	0.002

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1850.700003	0.002	1909.300001	0.001
10	1850.700001	0.001	1909.300004	0.002
20	1850.699996	-0.002	1909.299997	-0.001
30	1850.699997	-0.002	1909.299998	-0.001
40	1850.699997	-0.002	1909.299996	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1850.700001	0.001	1909.300000	0.001
6.375	1850.700002	0.001	1909.300001	0.001
8.63	1850.700002	0.001	1909.300003	0.002

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1850.700003	0.002	1909.300002	0.001
10	1850.700004	0.002	1909.300004	0.002
20	1850.699999	-0.001	1909.299999	-0.001
30	1850.699999	-0.001	1909.299999	-0.001
40	1850.699996	-0.002	1909.299997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.5	1850.700002	0.001	1909.300000	0.001
6.375	1850.700002	0.001	1909.300001	0.001
8.63	1850.700004	0.002	1909.300003	0.001

Note: The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

Frequency Error vs. Temperature

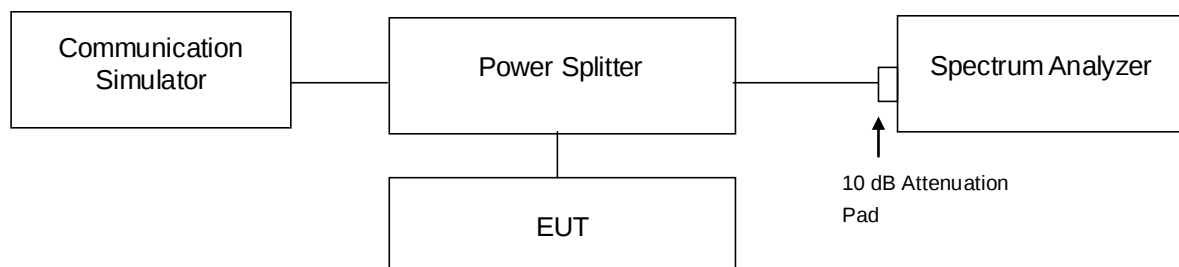
Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
0	1850.700003	0.002	1909.300003	0.002
10	1850.700004	0.002	1909.300003	0.001
20	1850.699998	-0.001	1909.299997	-0.001
30	1850.699997	-0.002	1909.299997	-0.002
40	1850.699998	-0.001	1909.299997	-0.002

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

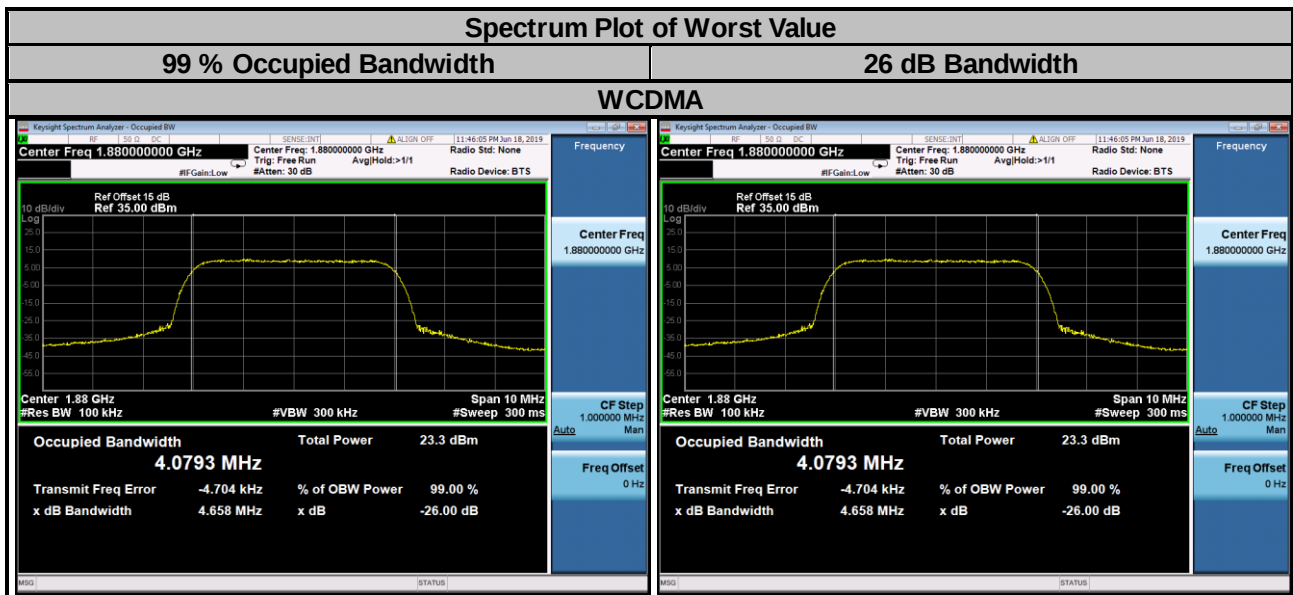
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.4.2 Test Setup

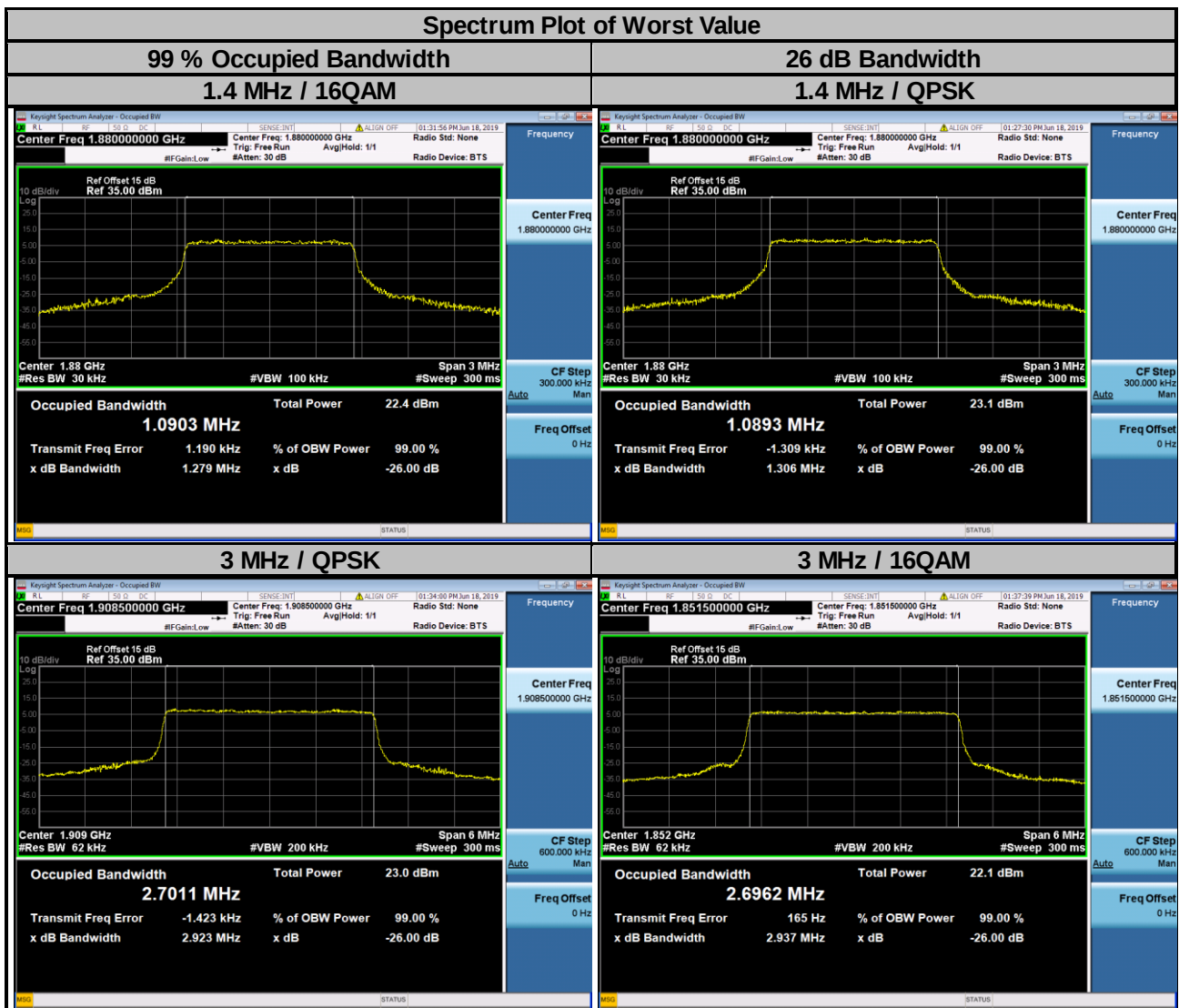


4.4.3 Test Result

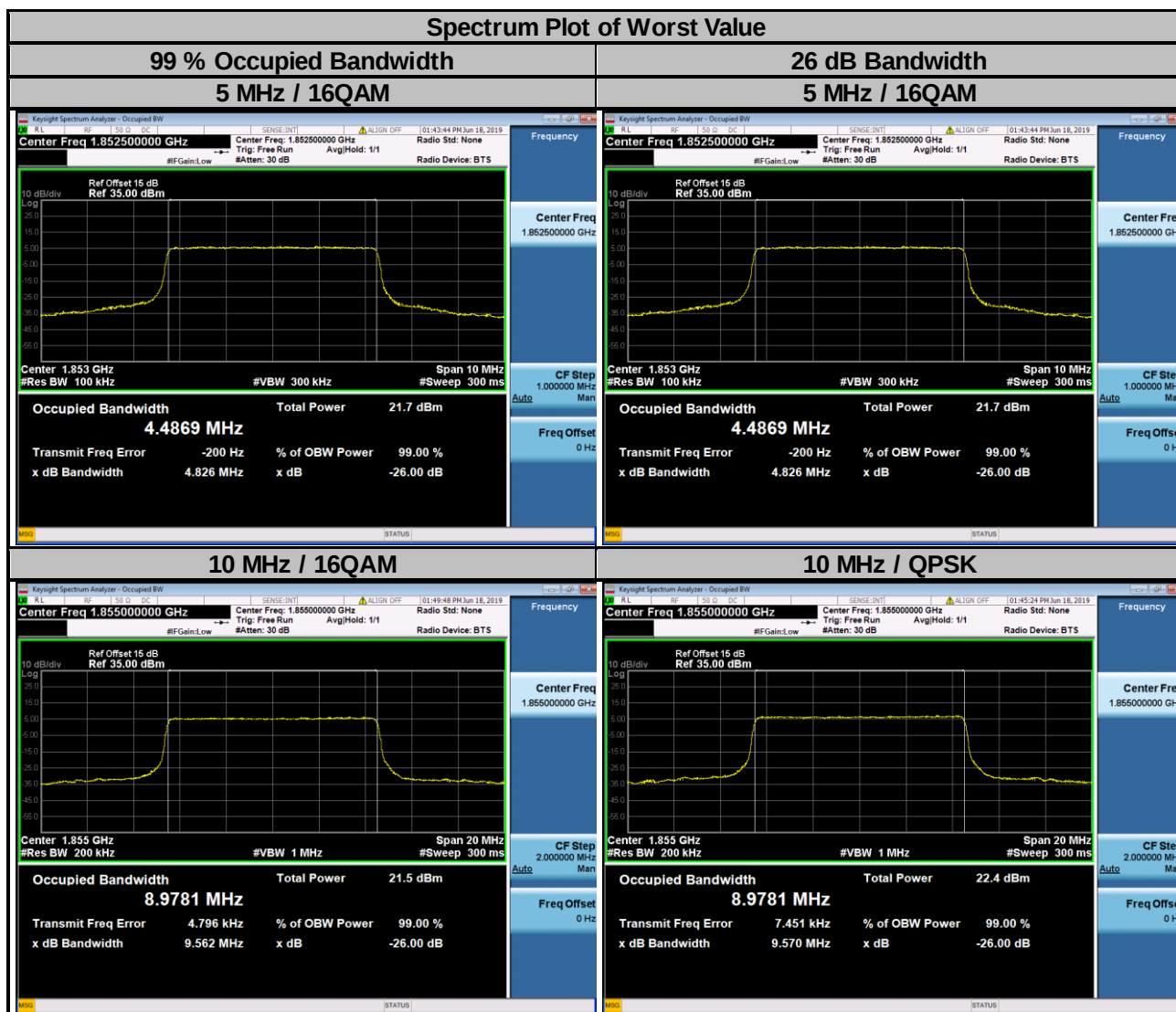
WCDMA			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.0775	4.650
9400	1880.0	4.0793	4.658
9538	1907.6	4.0709	4.639



LTE Band 2					
Channel Bandwidth: 1.4 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18607	1850.7	1.0864	1.0902	1.294	1.279
18900	1880.0	1.0893	1.0903	1.306	1.279
19193	1909.3	1.0879	1.0897	1.304	1.277
Channel Bandwidth: 3 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18615	1851.5	2.7001	2.6962	2.928	2.937
18900	1880.0	2.7006	2.6970	2.928	2.936
19185	1908.5	2.7011	2.6968	2.923	2.936



LTE Band 2					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18625	1852.5	4.4855	4.4869	4.812	4.826
18900	1880.0	4.4836	4.4834	4.806	4.814
19175	1907.5	4.4821	4.4845	4.816	4.815
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18650	1855.0	8.9781	8.9781	9.570	9.562
18900	1880.0	8.9618	8.9631	9.525	9.562
19150	1905.0	8.9447	8.9492	9.514	9.519



LTE Band 2					
Channel Bandwidth: 15 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18675	1857.5	13.488	13.473	14.33	14.39
18900	1880.0	13.461	13.449	14.32	14.32
19125	1902.5	13.412	13.400	14.24	14.26
Channel Bandwidth: 20 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18700	1860.0	17.969	17.984	19.12	19.05
18900	1880.0	17.916	17.932	19.08	19.07
19100	1900.0	17.868	17.887	19.03	19.03

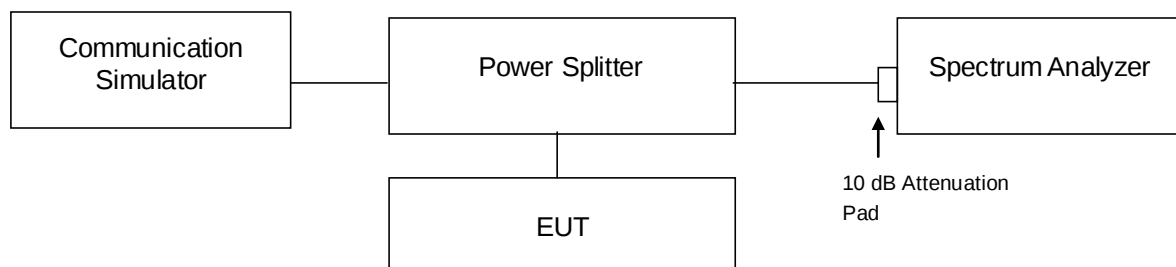


4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

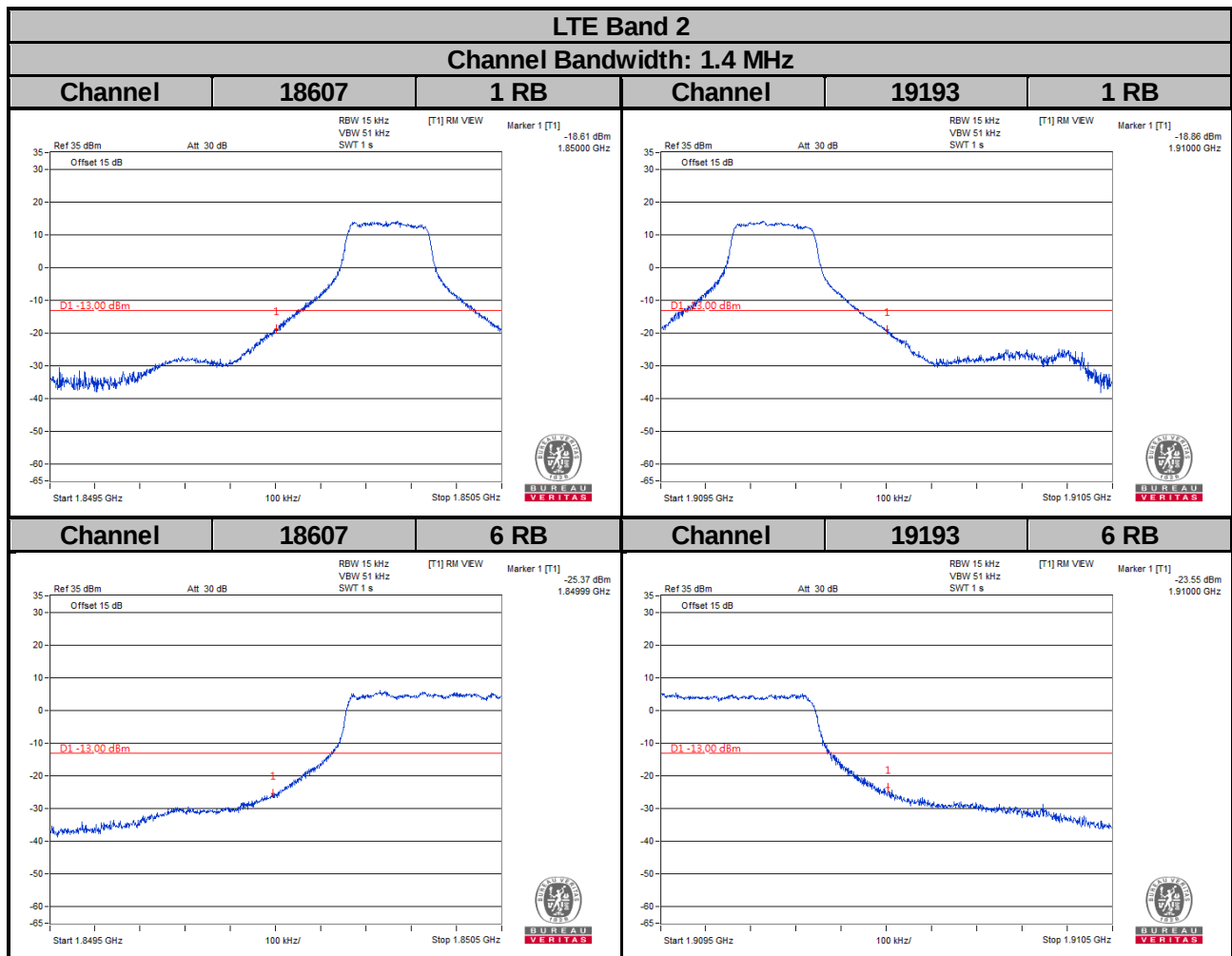
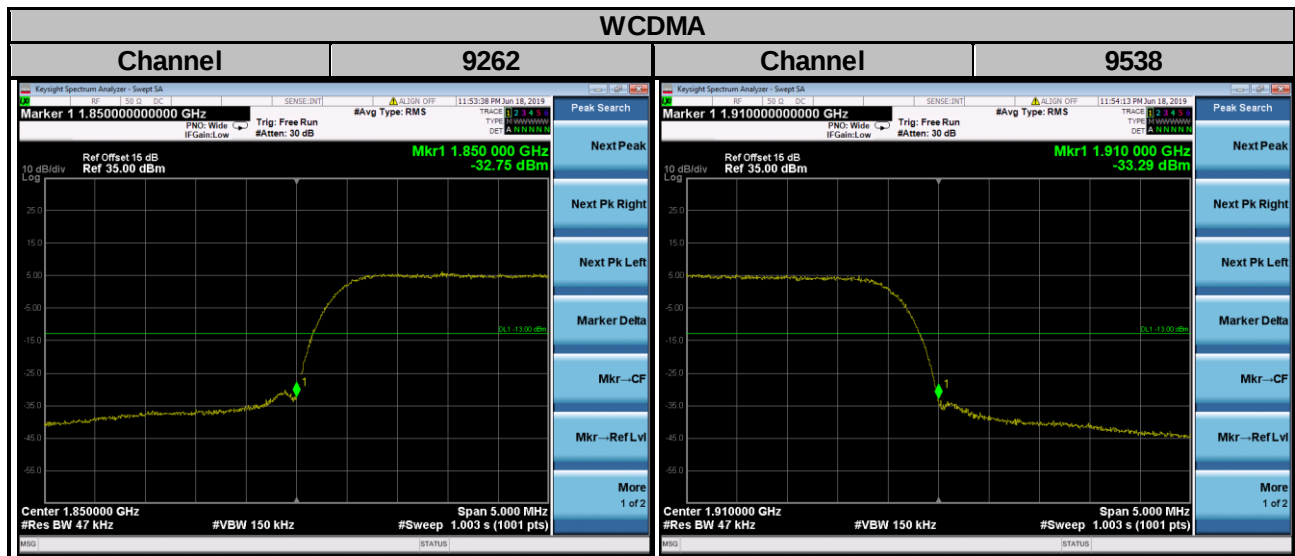
4.5.2 Test Setup

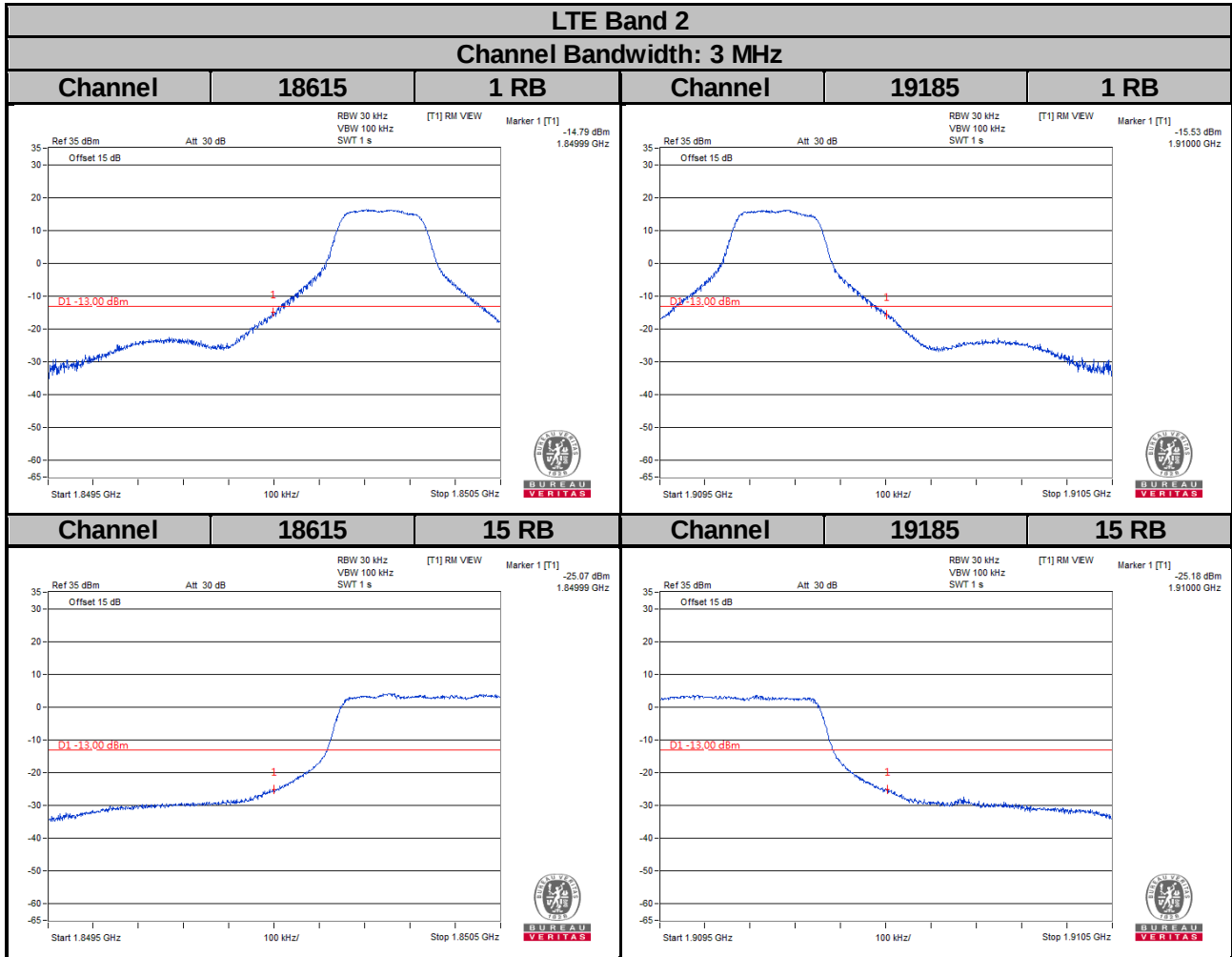


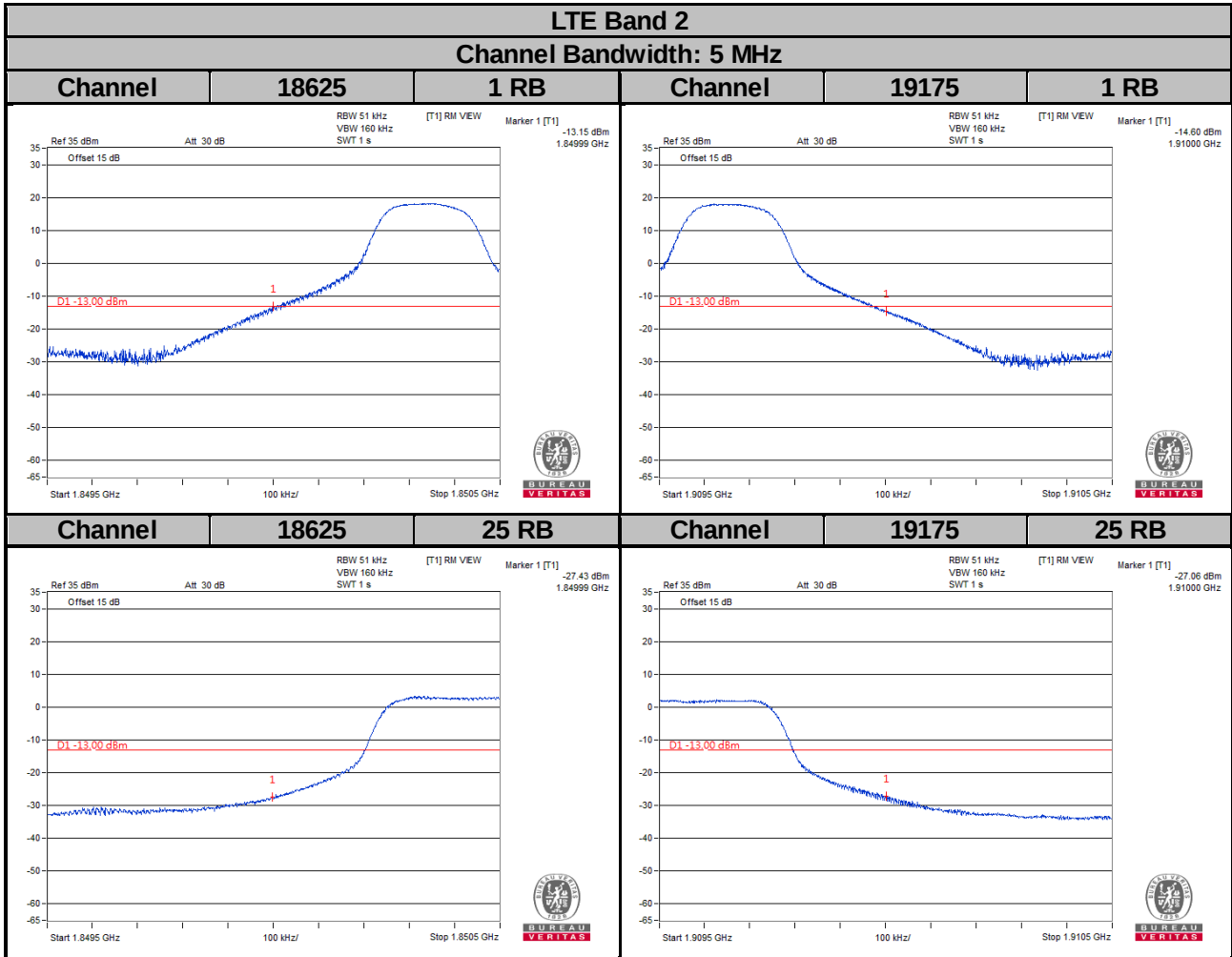
4.5.3 Test Procedures

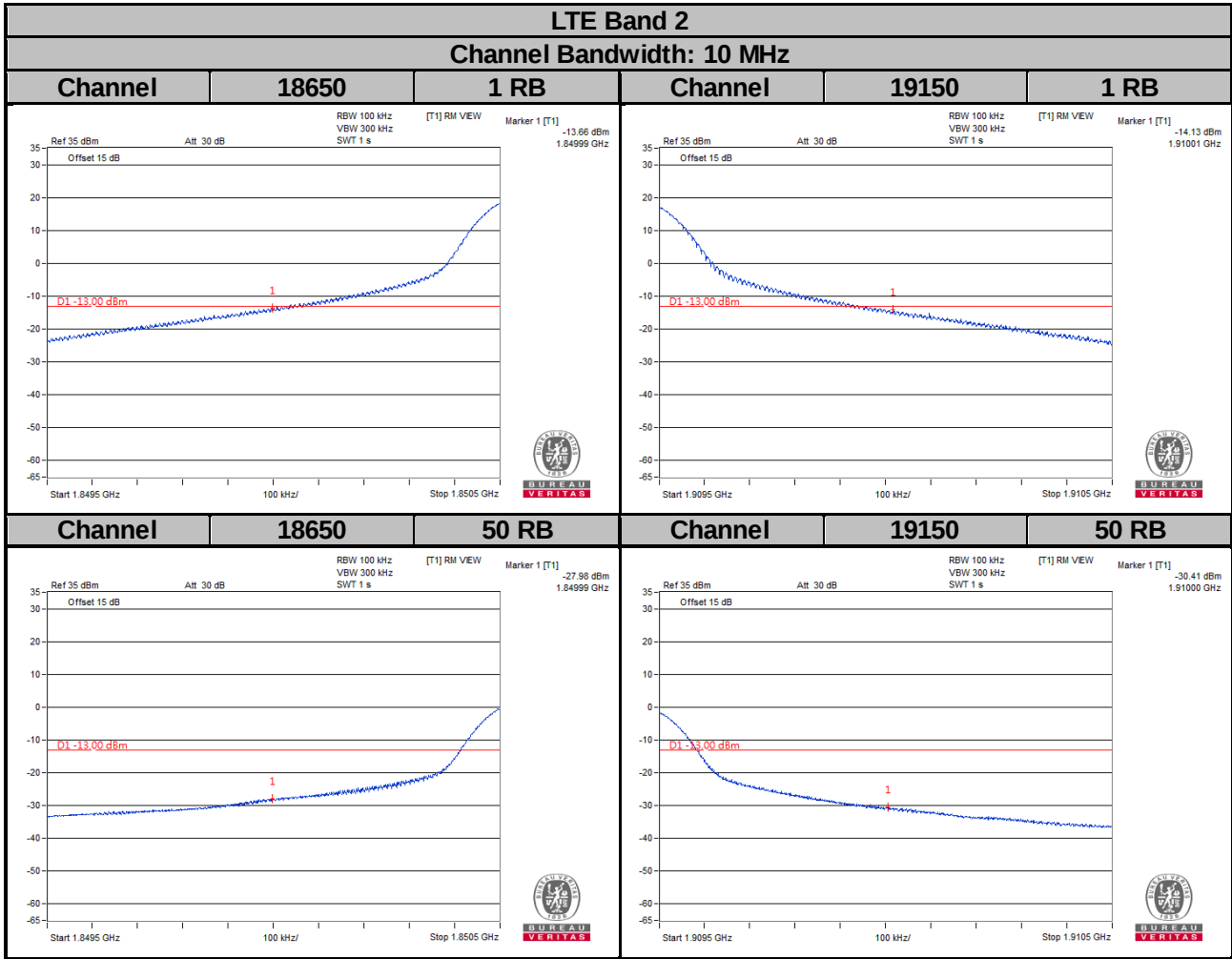
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 47 kHz and VB of the spectrum is 150 kHz (WCDMA).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 15 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 160 kHz (LTE Bandwidth 5 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
- Record the max trace plot into the test report.

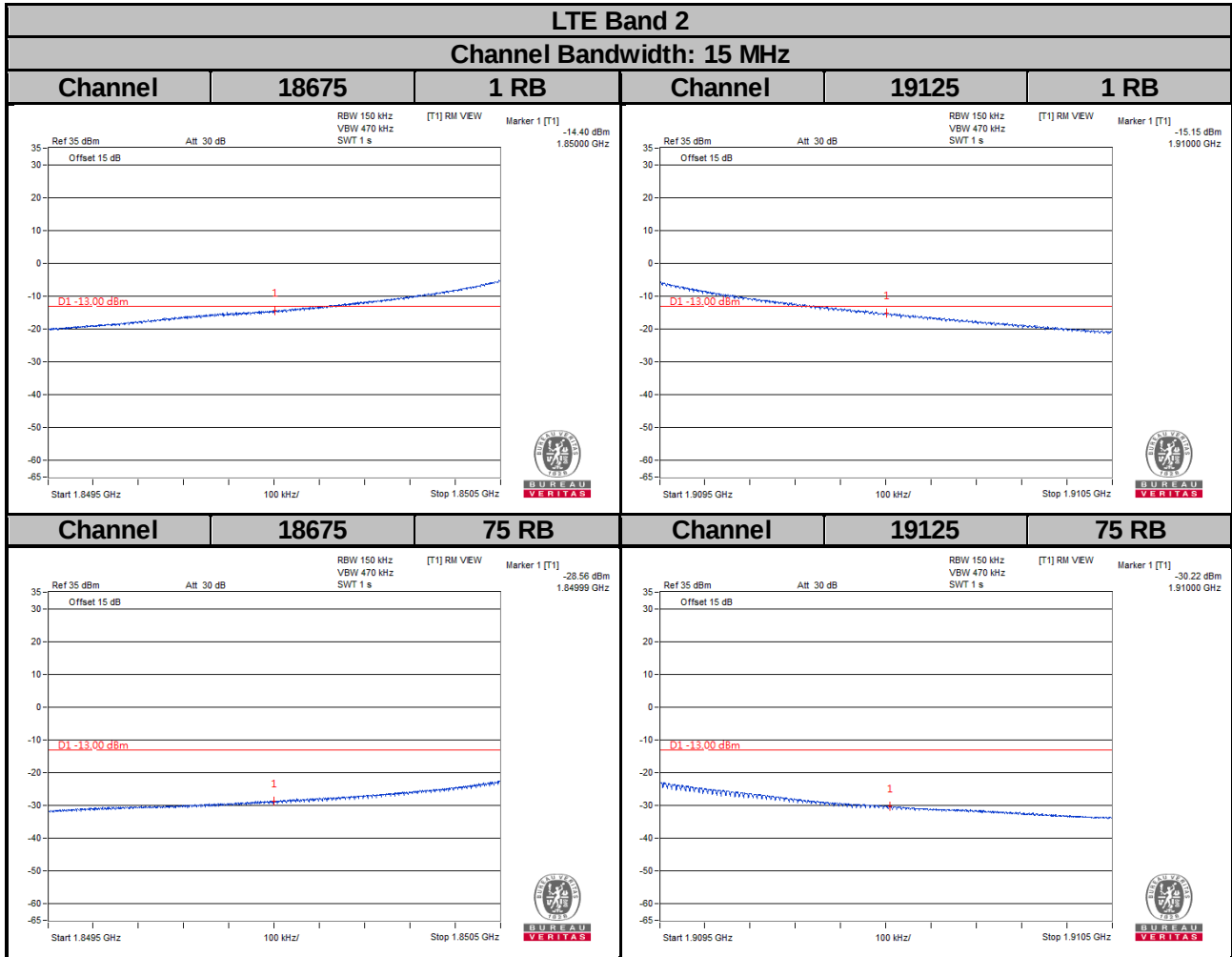
4.5.4 Test Results

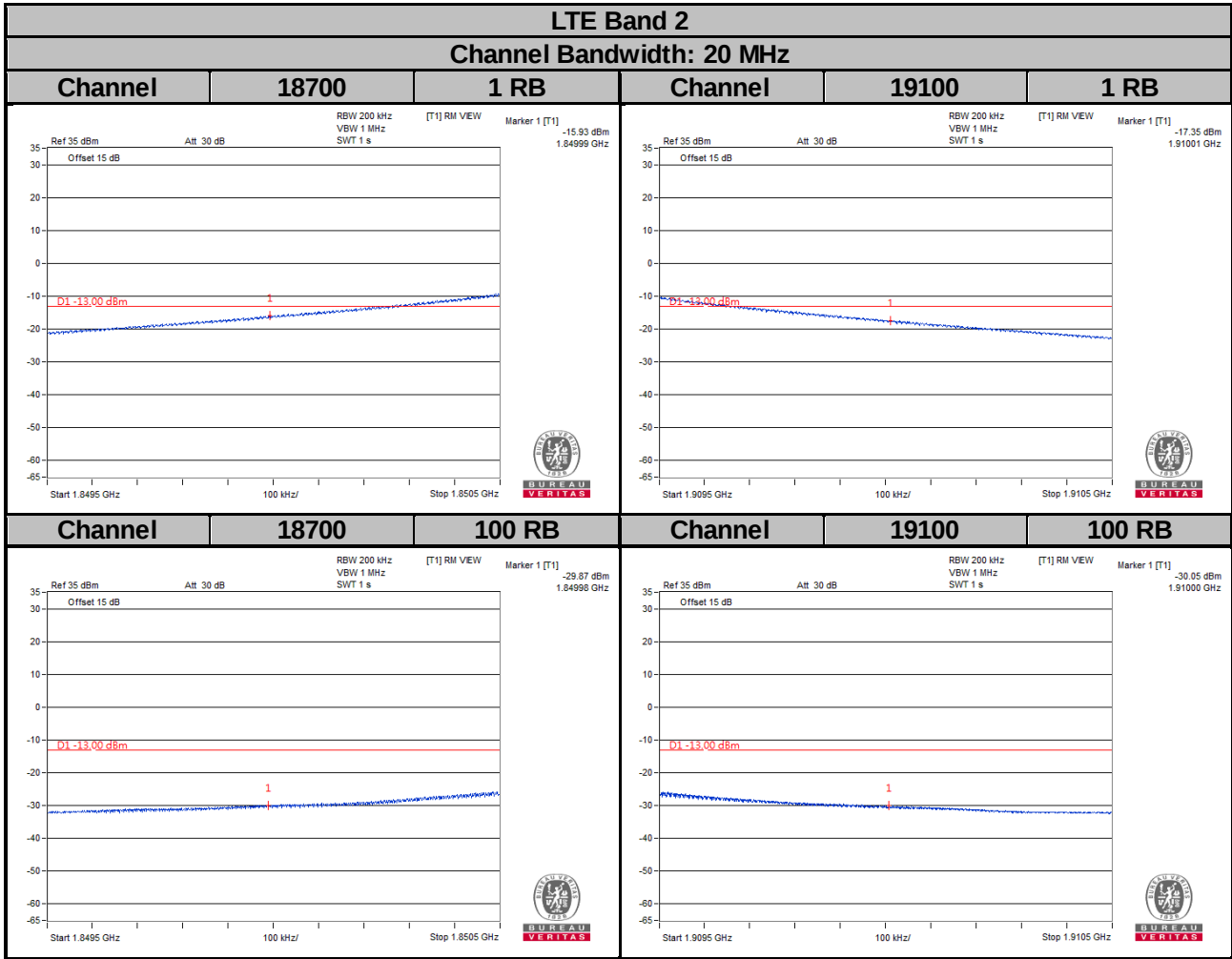










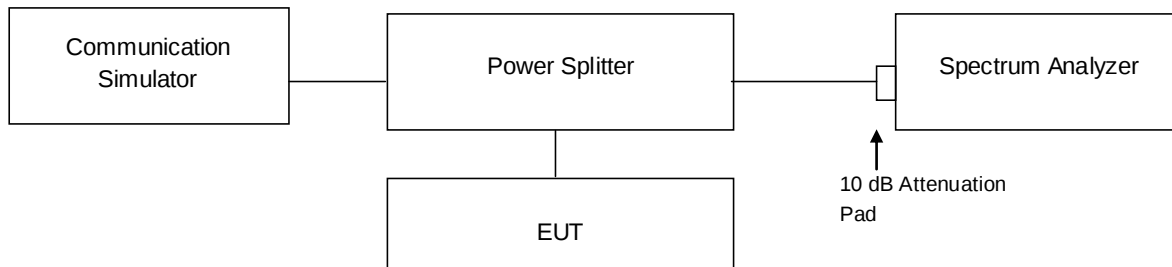


4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.6.2 Test Setup

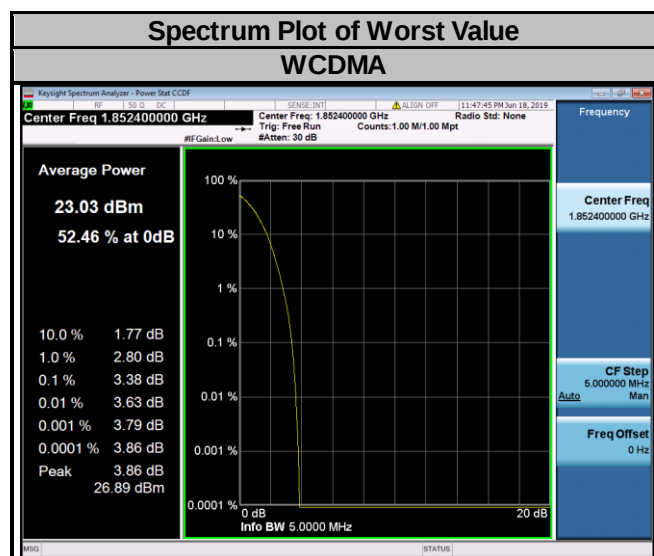


4.6.3 Test Procedures

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		WCDMA
9262	1852.4	3.38
9400	1880.0	3.23
9538	1907.6	3.38

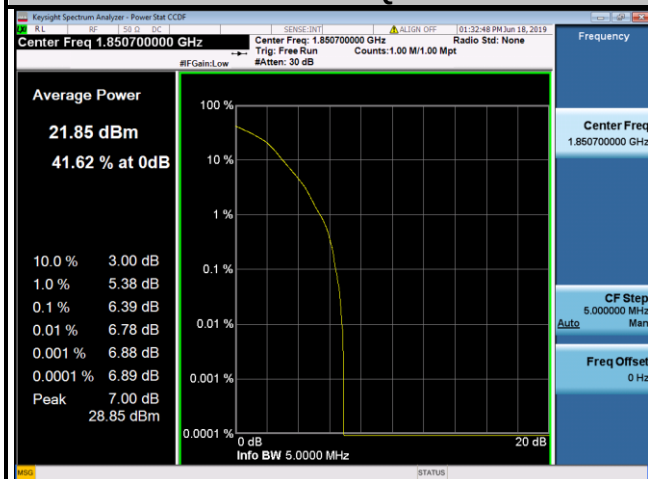


LTE Band 2

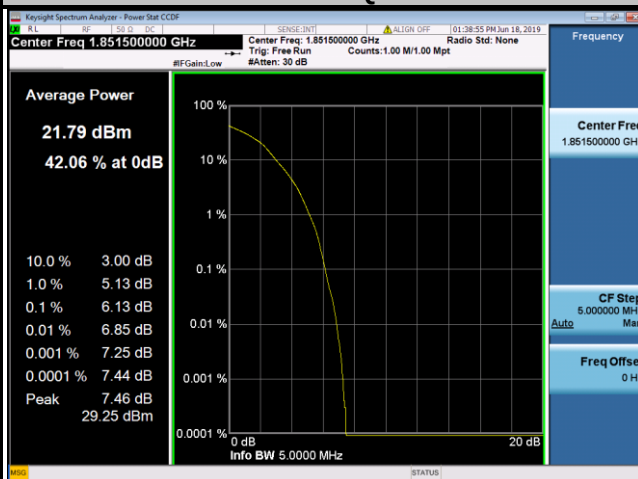
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	5.49	6.39	18615	1851.5	5.27	6.13
18900	1880.0	4.92	5.81	18900	1880.0	4.79	5.64
19193	1909.3	5.38	6.37	19185	1908.5	5.32	6.09

Spectrum Plot of Worst Value

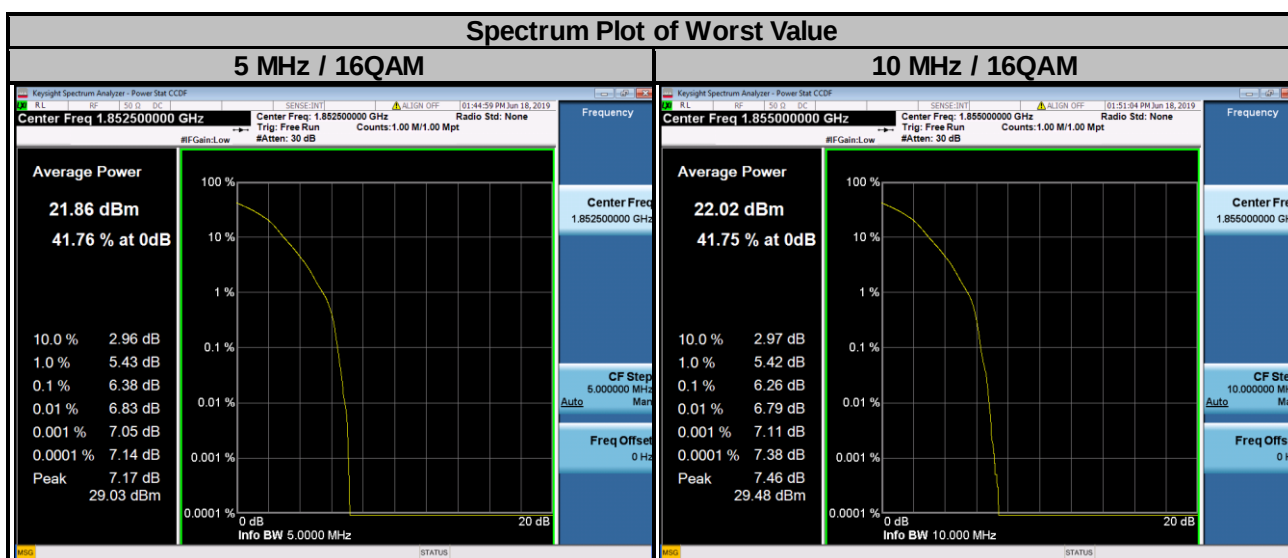
1.4 MHz / 16QAM



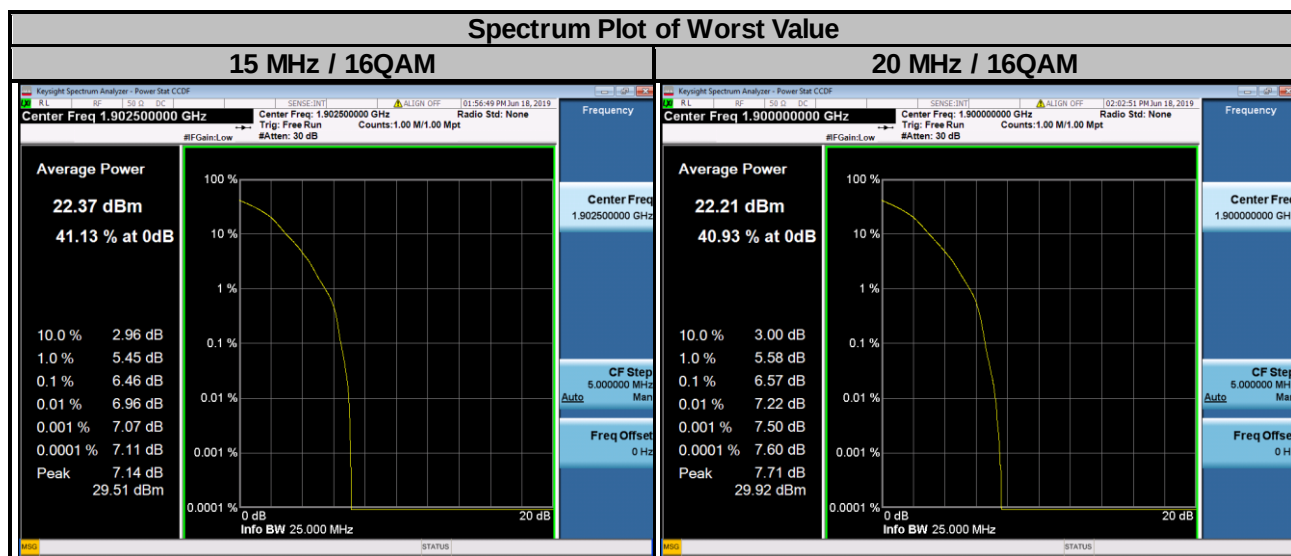
3 MHz / 16QAM



LTE Band 2							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	5.48	6.38	18650	1855.0	5.39	6.26
18900	1880.0	4.94	5.73	18900	1880.0	4.82	5.59
19175	1907.5	5.22	6.05	19150	1905.0	5.14	6.02



LTE Band 2							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	5.33	6.37	18700	1860.0	5.42	6.11
18900	1880.0	4.74	5.55	18900	1880.0	4.89	5.64
19125	1902.5	5.64	6.46	19100	1900.0	5.61	6.57

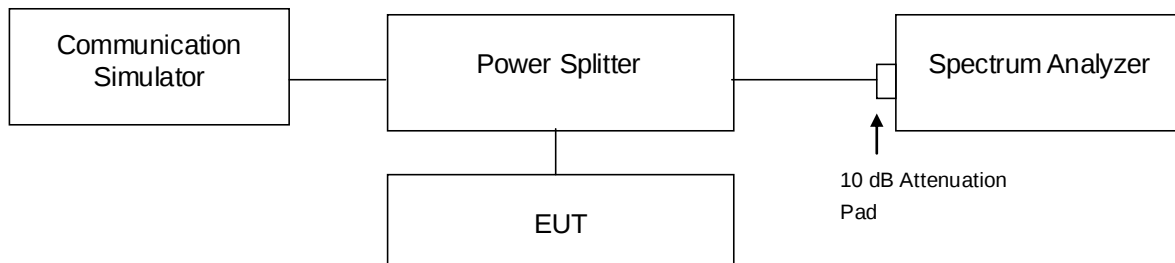


4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

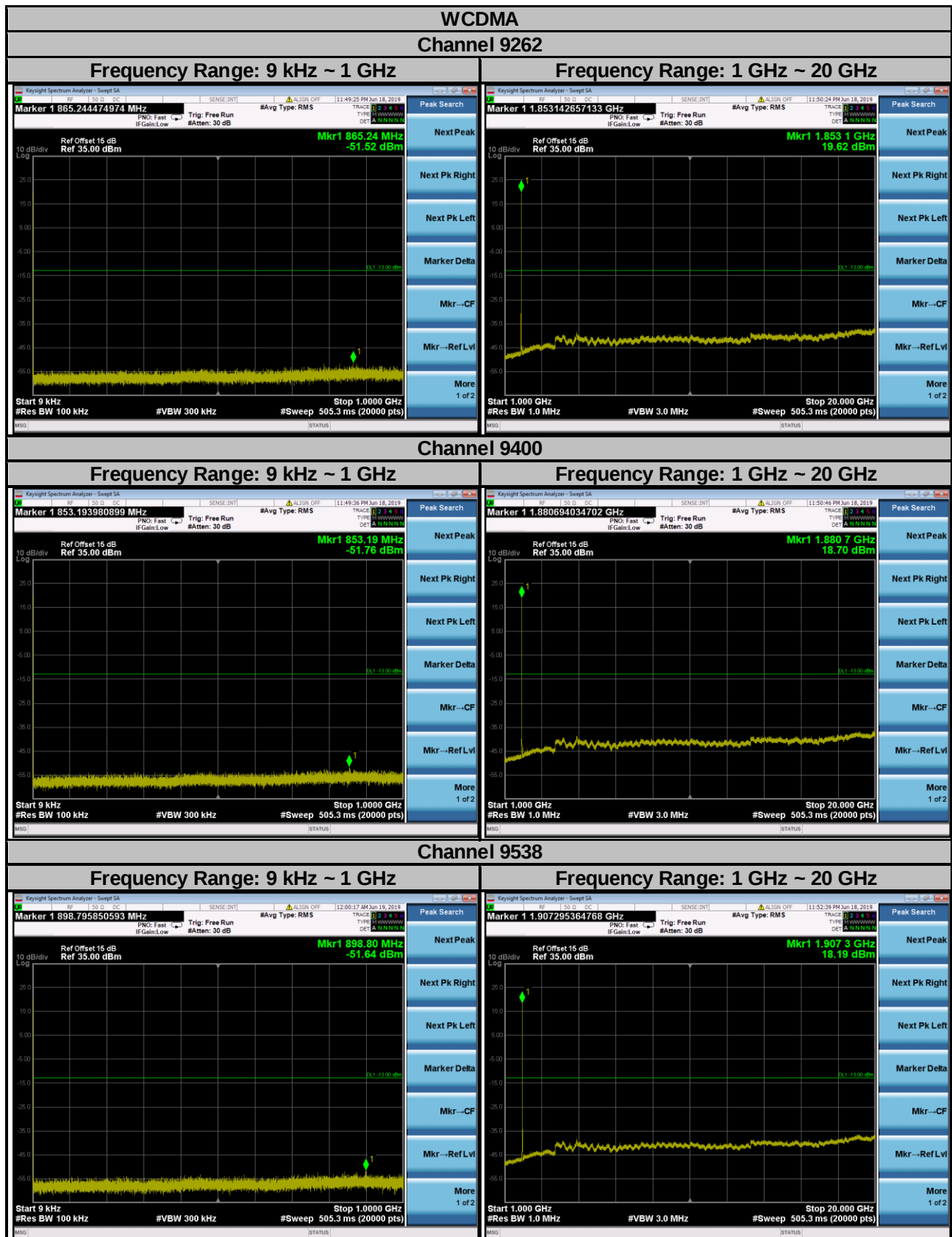
4.7.2 Test Setup



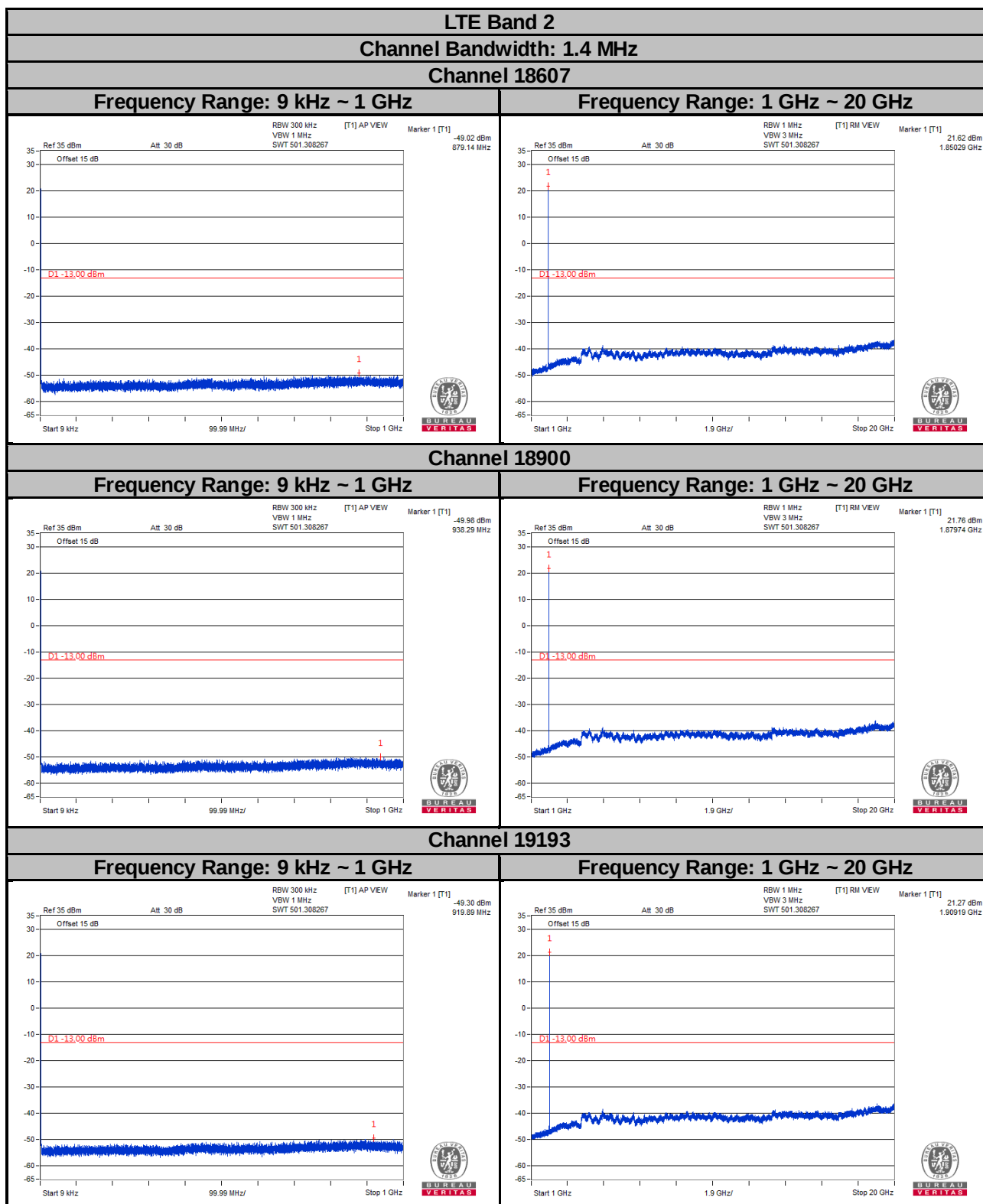
4.7.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz is used for WCDMA conducted emission measurement. RBW = 300 kHz and VBW = 1 MHz is used for LTE conducted emission measurement.
- Measuring frequency range is from 1 GHz to 20 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.
- Spectrum RBW settings are referenced to ANSI 63.26 section 5.7.2.

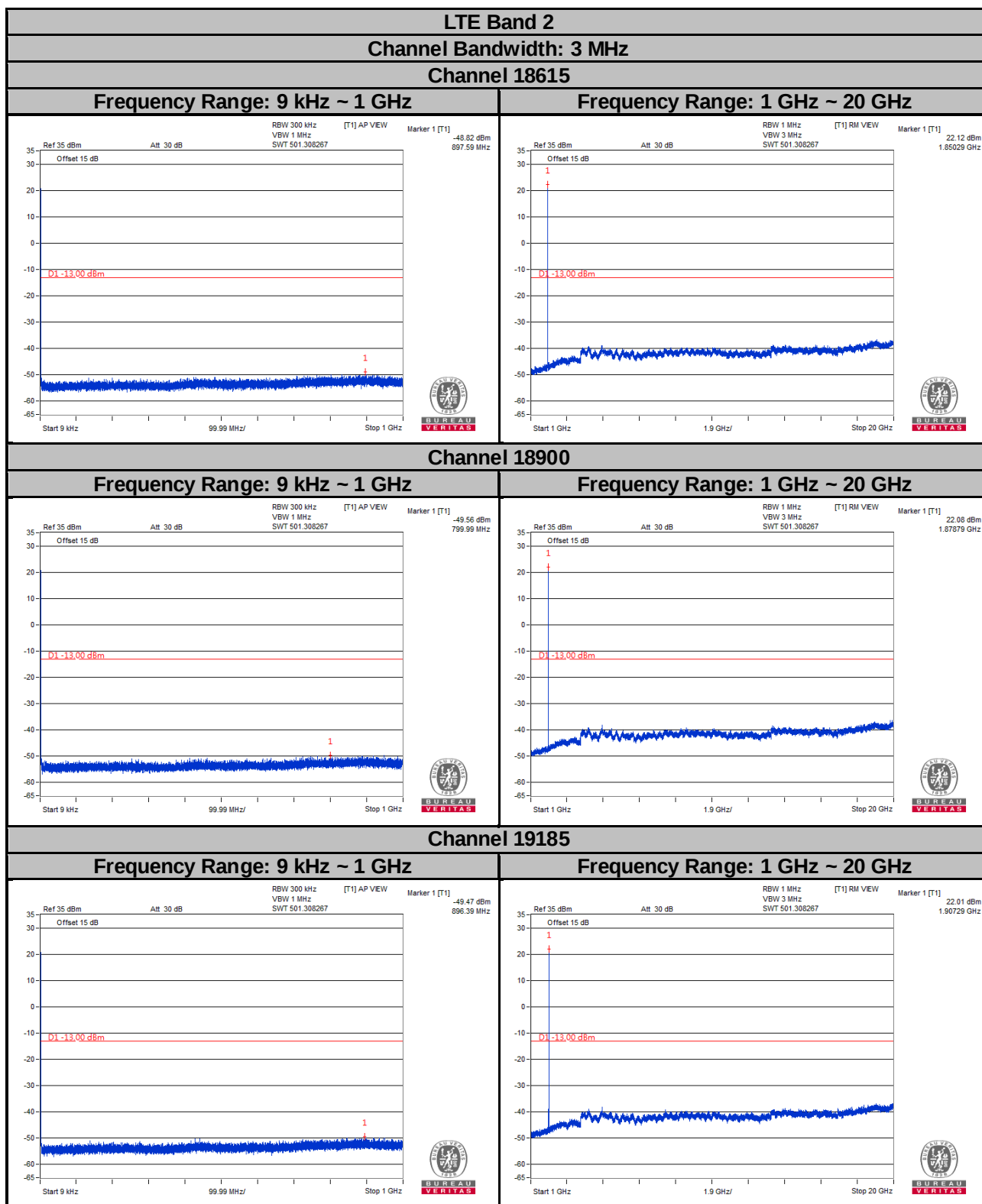
4.7.4 Test Results



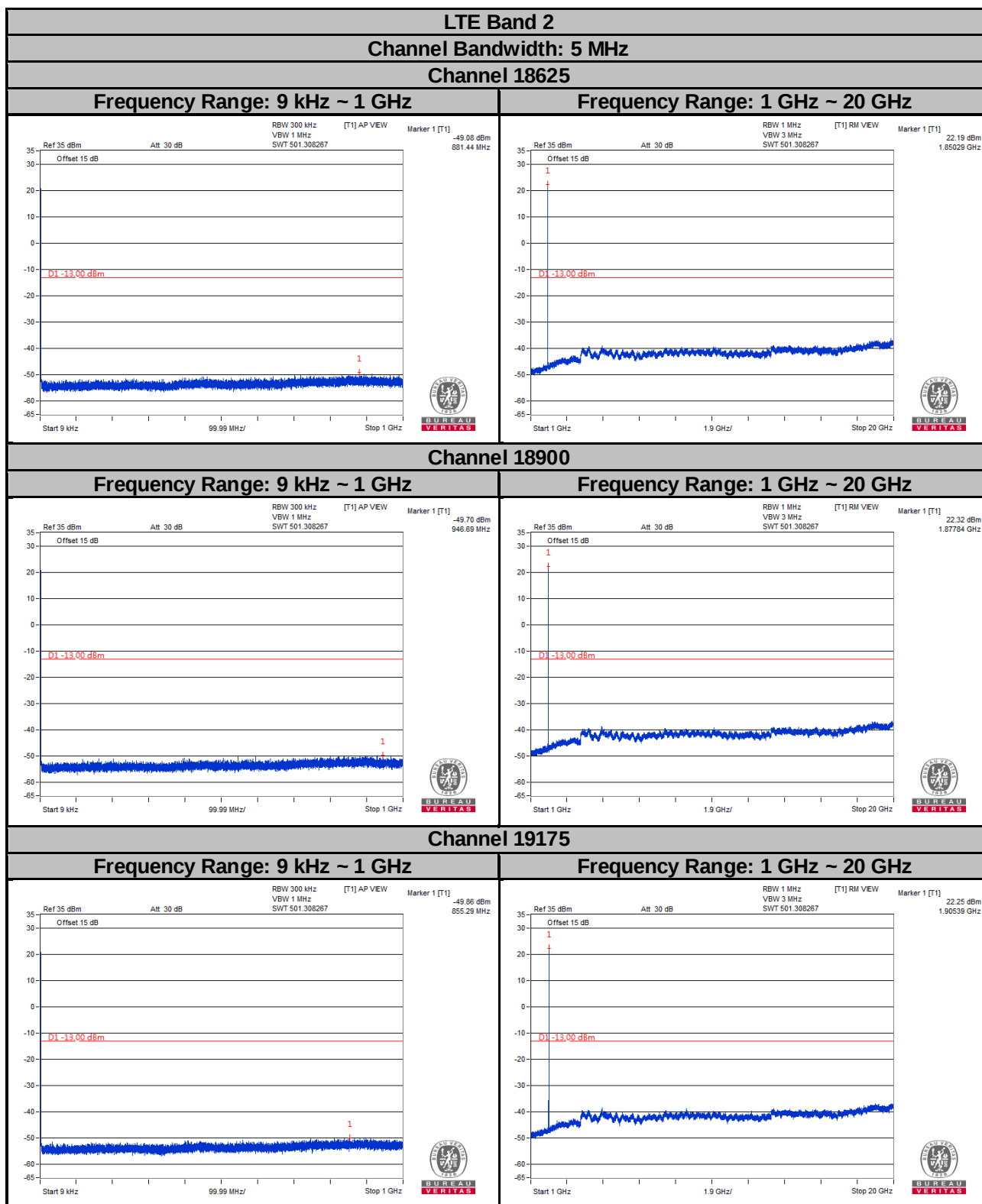
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



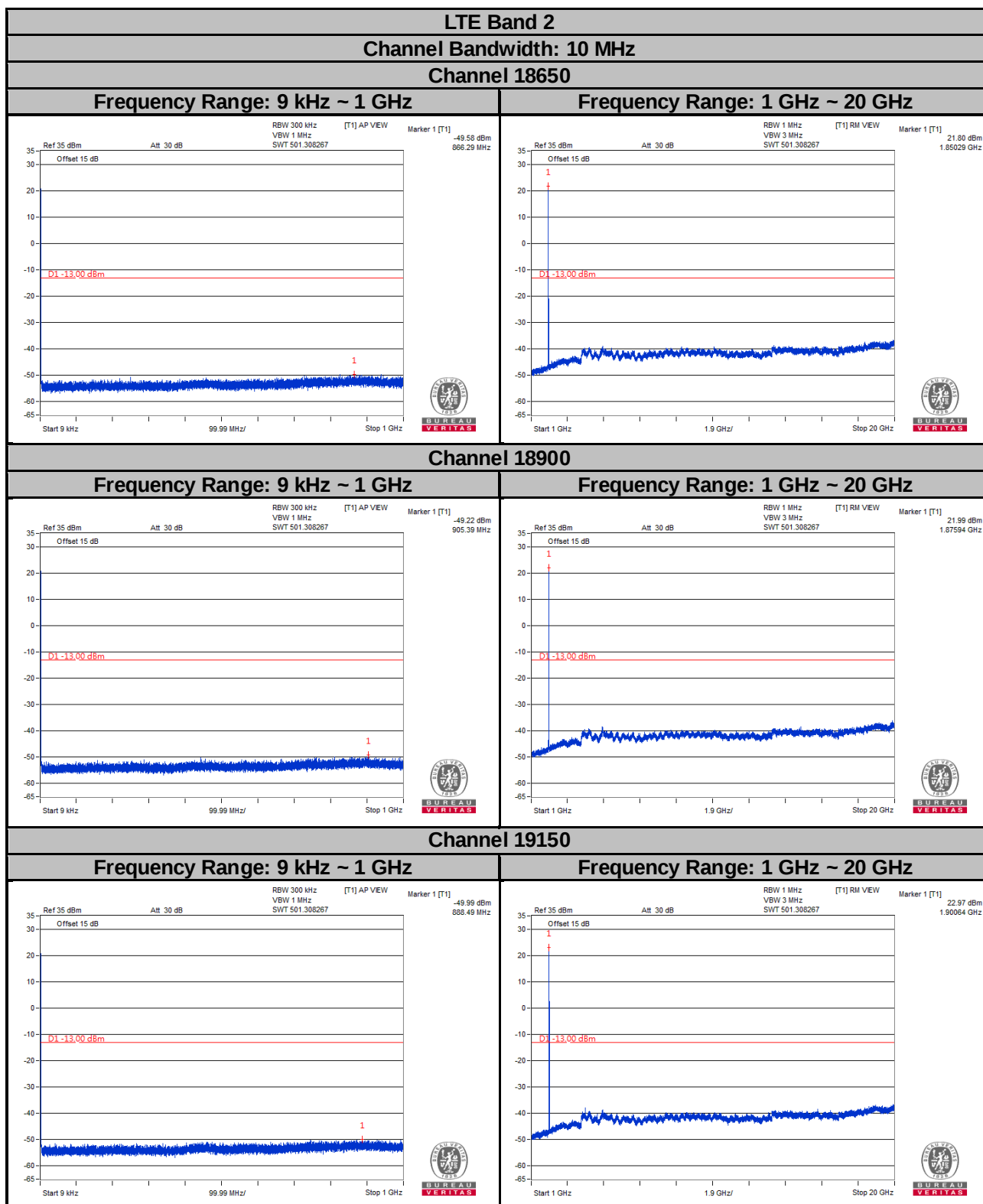
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



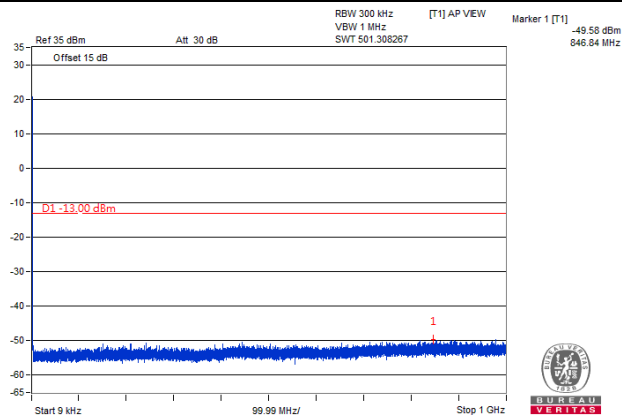
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2

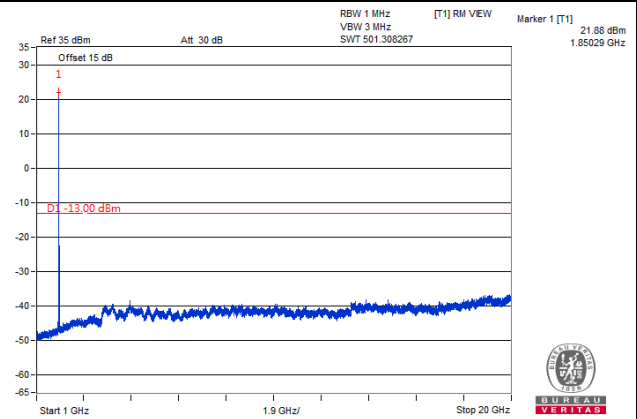
Channel Bandwidth: 15 MHz

Channel 18675

Frequency Range: 9 kHz ~ 1 GHz

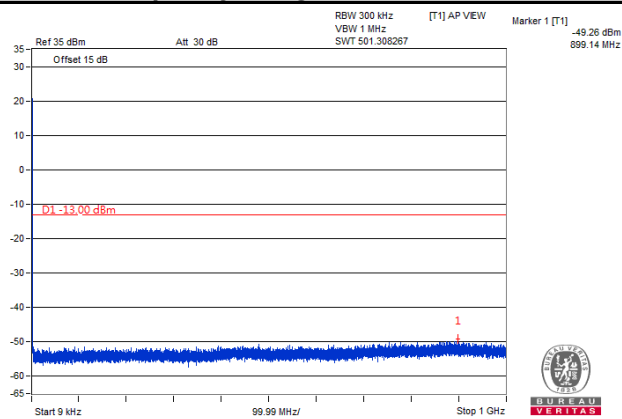


Frequency Range: 1 GHz ~ 20 GHz

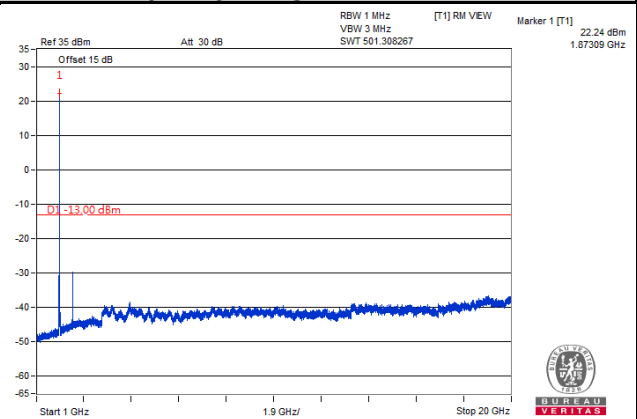


Channel 18900

Frequency Range: 9 kHz ~ 1 GHz

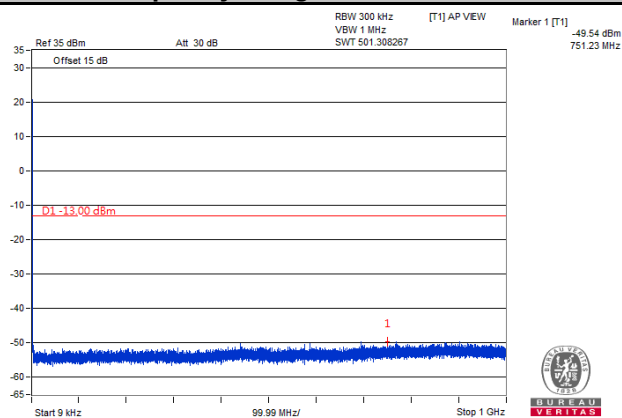


Frequency Range: 1 GHz ~ 20 GHz

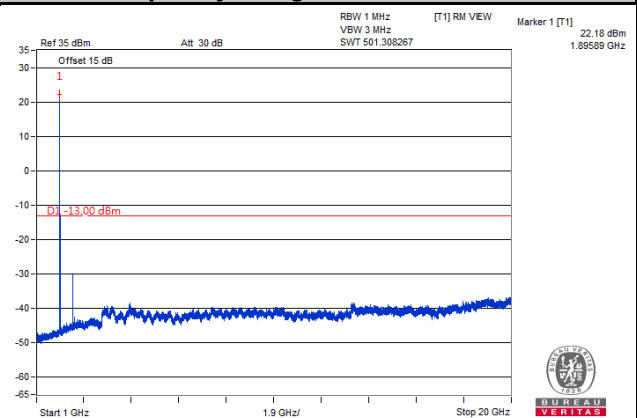


Channel 19125

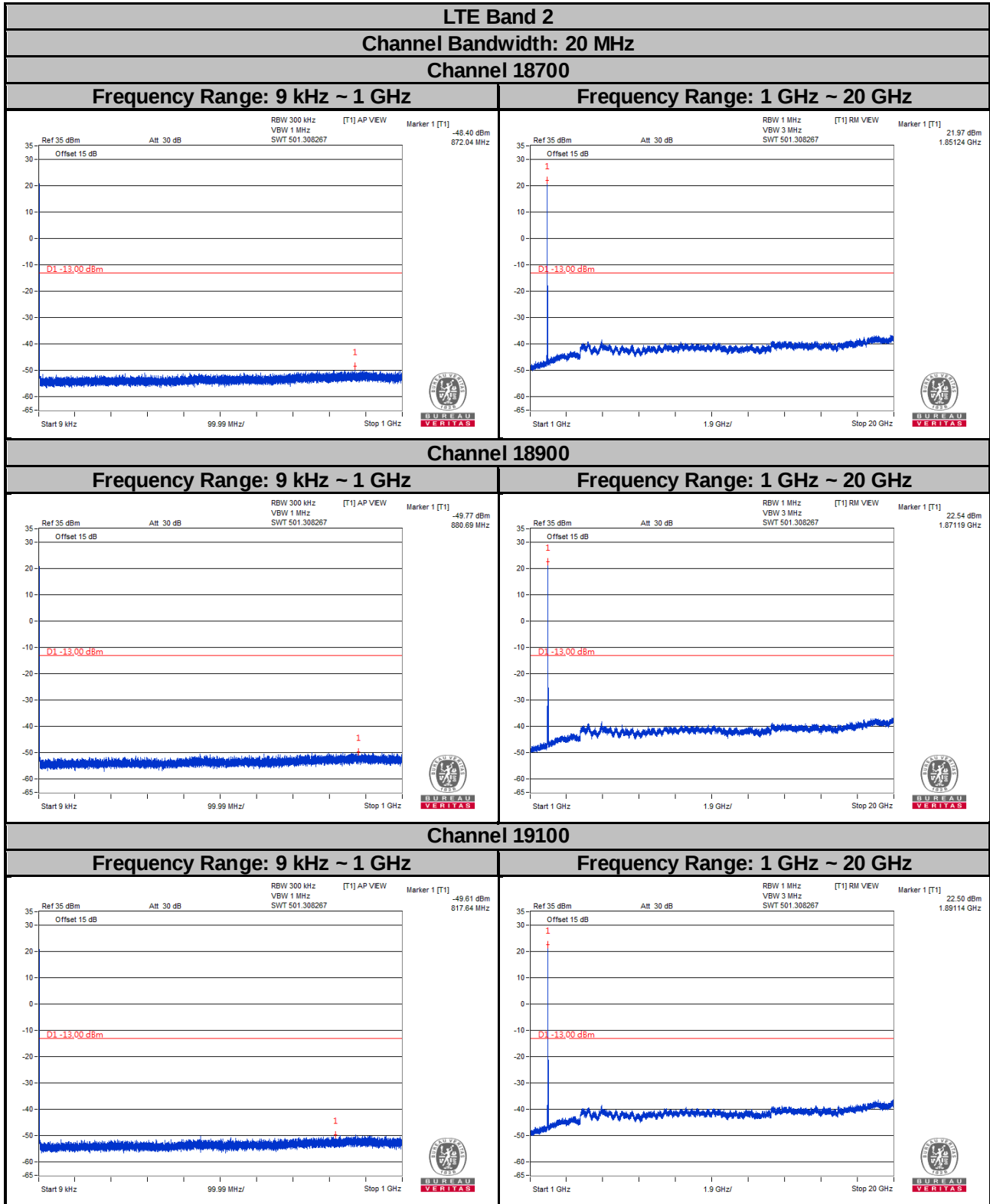
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 20 GHz



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit is equal to -13 dBm.

4.8.2 Test Procedure

- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

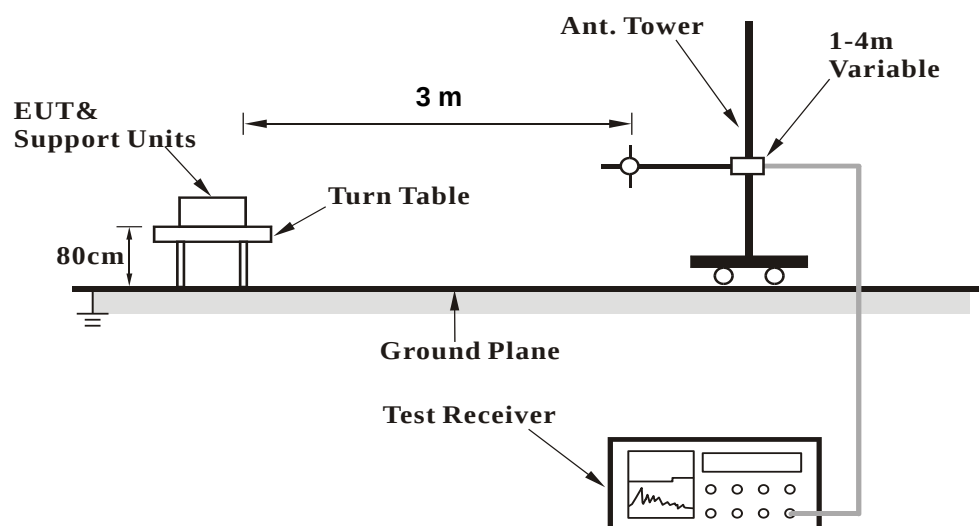
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.8.3 Deviation from Test Standard

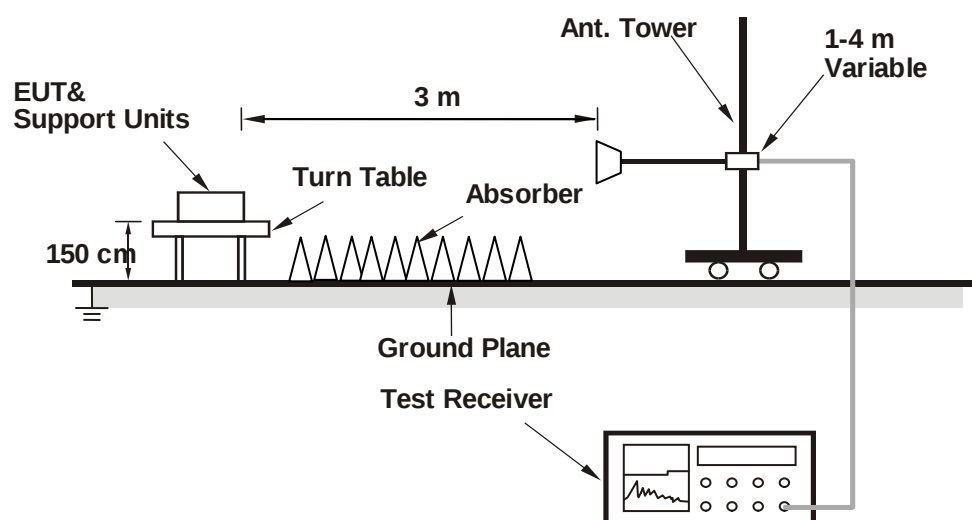
No deviation.

4.8.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.8.5 Test Results

WCDMA:

Low Channel

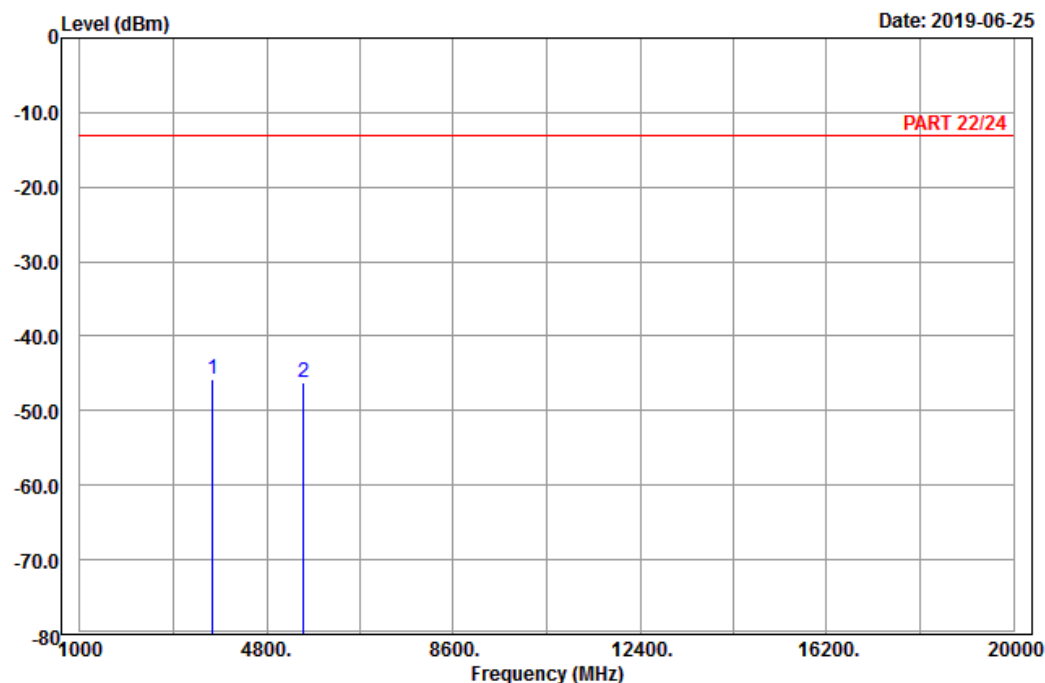


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-25



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : Band II_Link_CH9262
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1 pp	3704.80	-45.87	-61.75	15.88	-13.00	-32.87	Peak
2	5557.20	-46.17	-66.51	20.34	-13.00	-33.17	Peak

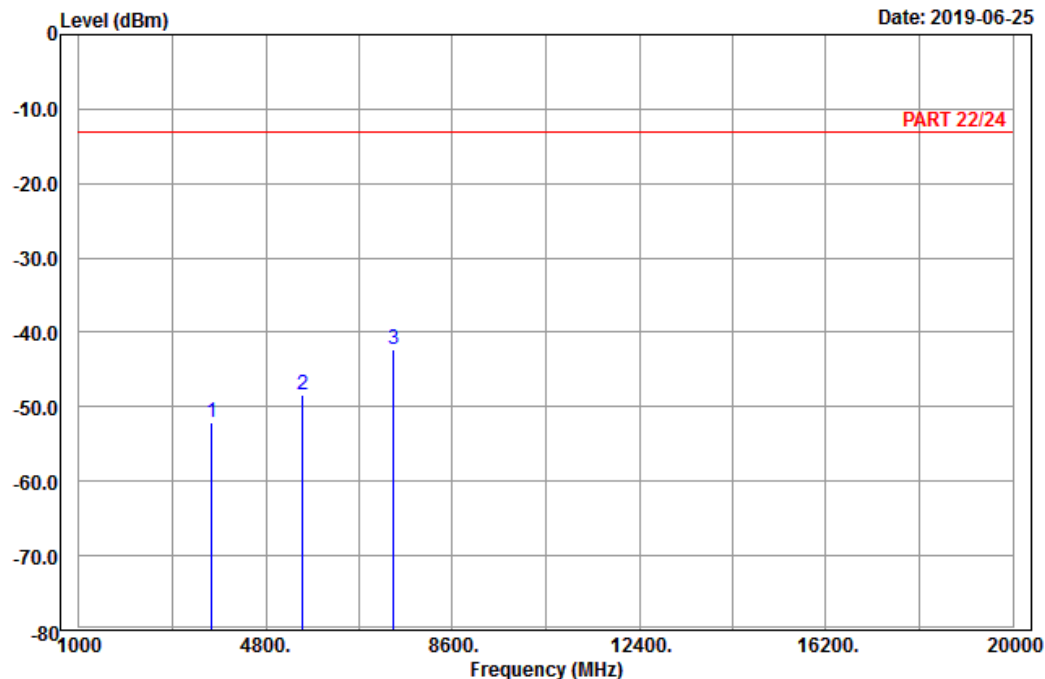


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A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : Band II_Link_CH9262
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3704.80	-52.05	-67.93	15.88	-13.00	-39.05	Peak
2	5557.20	-48.29	-68.63	20.34	-13.00	-35.29	Peak
3 pp	7409.60	-42.30	-64.58	22.28	-13.00	-29.30	Peak

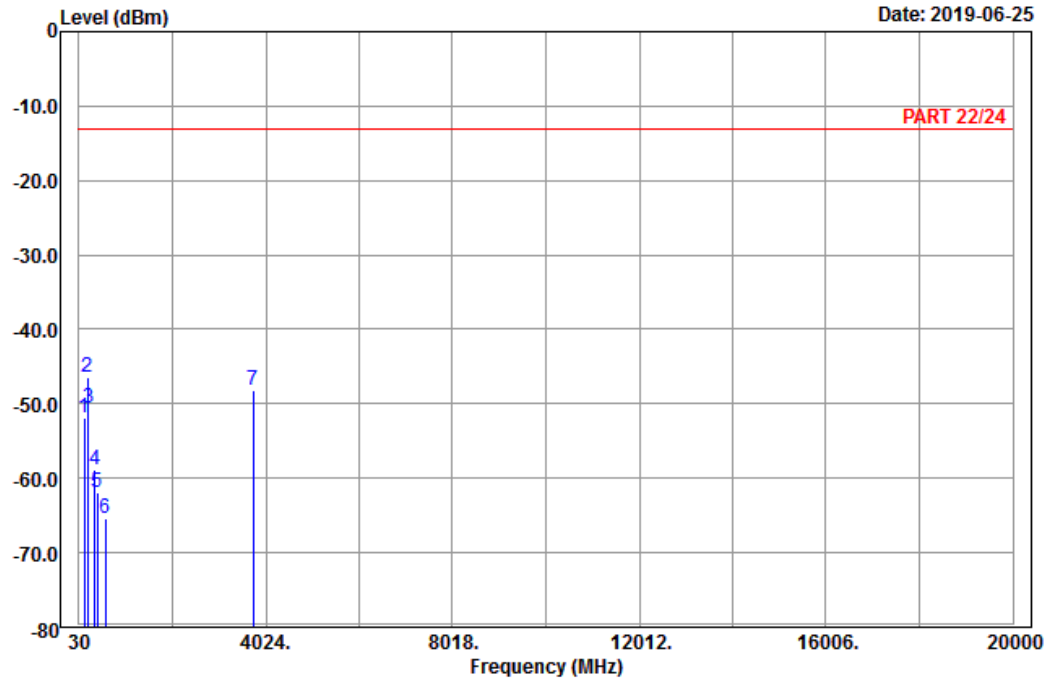
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 13



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : Band II_Link_CH9400
 Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	148.53	-51.98	-44.08	-7.90	-13.00	-38.98	Peak
2 pp	220.35	-46.36	-40.45	-5.91	-13.00	-33.36	Peak
3	236.55	-50.66	-44.97	-5.69	-13.00	-37.66	Peak
4	368.60	-58.83	-54.43	-4.40	-13.00	-45.83	Peak
5	424.60	-61.98	-58.69	-3.29	-13.00	-48.98	Peak
6	599.60	-65.35	-65.74	0.39	-13.00	-52.35	Peak
7	3760.00	-48.21	-64.35	16.14	-13.00	-35.21	Peak

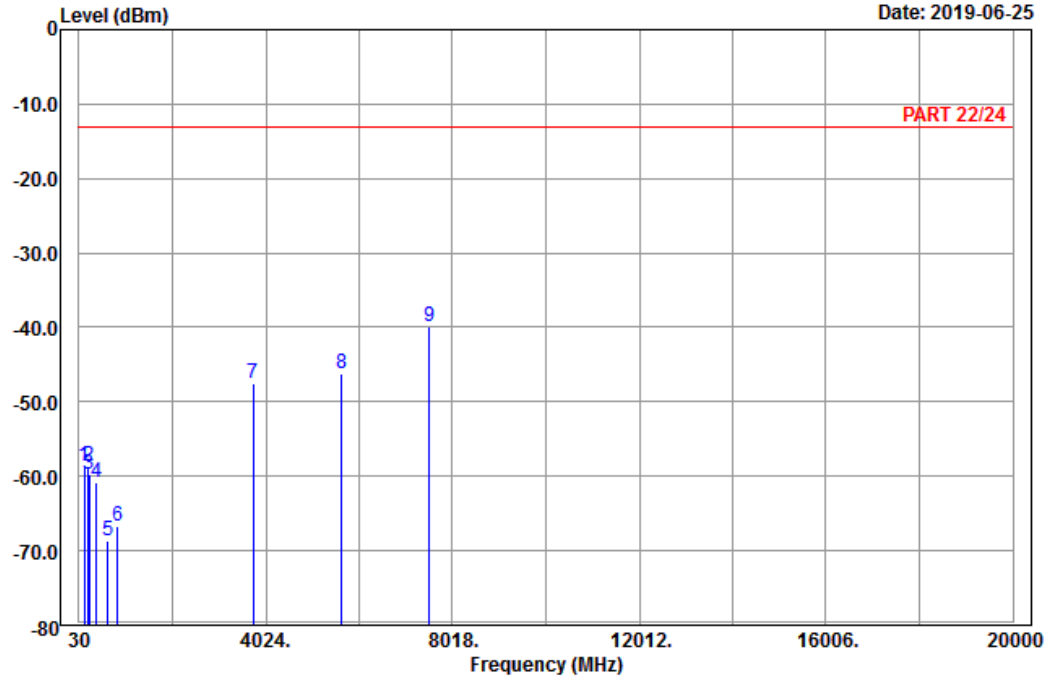


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A D T

Data: 14

Date: 2019-06-25



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : Band II_Link_CH9400
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	148.26	-58.70	-50.80	-7.90	-13.00	-45.70	Peak
2	228.72	-58.55	-52.76	-5.79	-13.00	-45.55	Peak
3	250.86	-59.68	-54.16	-5.52	-13.00	-46.68	Peak
4	400.10	-60.76	-58.00	-2.76	-13.00	-47.76	Peak
5	651.40	-68.70	-68.56	-0.14	-13.00	-55.70	Peak
6	846.70	-66.79	-68.27	1.48	-13.00	-53.79	Peak
7	3760.00	-47.46	-63.60	16.14	-13.00	-34.46	Peak
8	5640.00	-46.14	-66.61	20.47	-13.00	-33.14	Peak
9 pp	7520.00	-39.82	-62.50	22.68	-13.00	-26.82	Peak

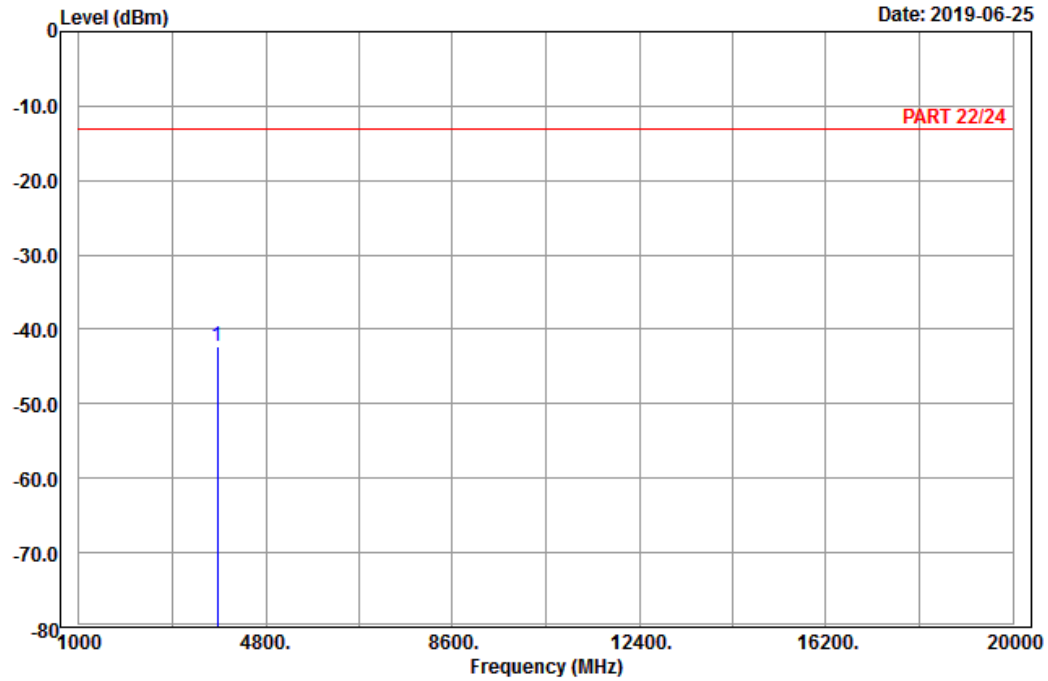
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : Band II_Link_CH9538
 Tested by: Karl Lee

		Read	Limit	Over	
Freq	Level	Level	Factor	Line	Limit Remark
MHz	dBm	dBm	dB	dBm	dB
1 pp 3815.20	-42.26	-58.67	16.41	-13.00	-29.26 Peak

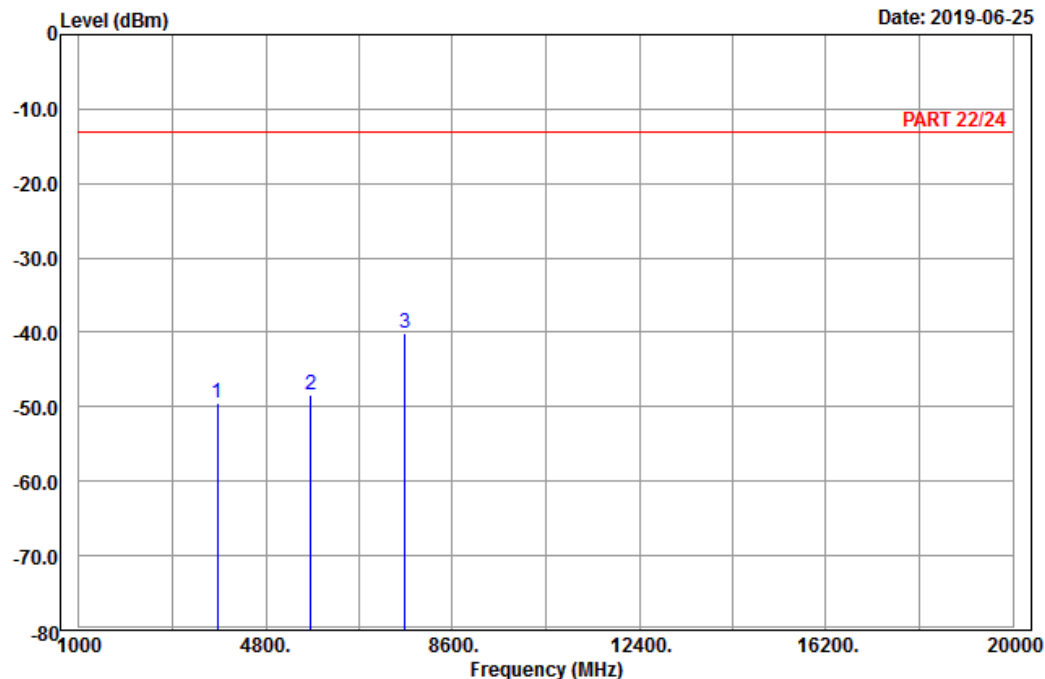


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : Band II_Link_CH9538
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3815.20	-49.50	-65.91	16.41	-13.00	-36.50	Peak
2	5722.80	-48.34	-68.61	20.27	-13.00	-35.34	Peak
3 pp	7630.40	-40.15	-63.17	23.02	-13.00	-27.15	Peak

LTE Band 2
Channel Bandwidth: 1.4 MHz / QPSK
Low Channel

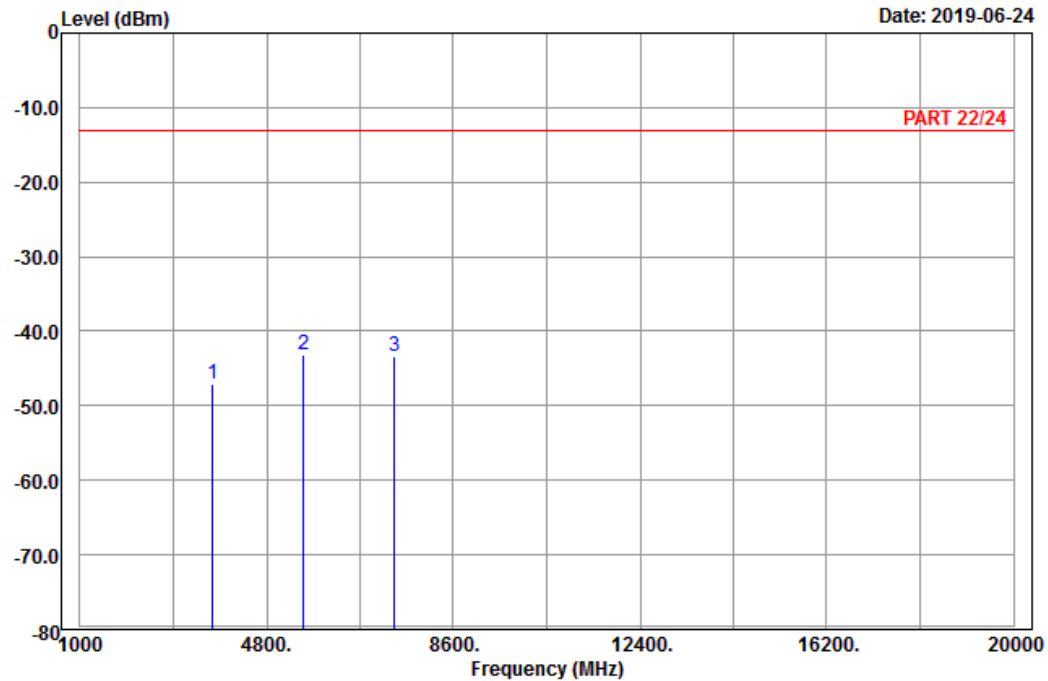


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18607
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3701.40	-47.17	-63.05	15.88	-13.00	-34.17	Peak
2 pp	5552.10	-43.25	-63.59	20.34	-13.00	-30.25	Peak
3	7402.80	-43.34	-65.62	22.28	-13.00	-30.34	Peak

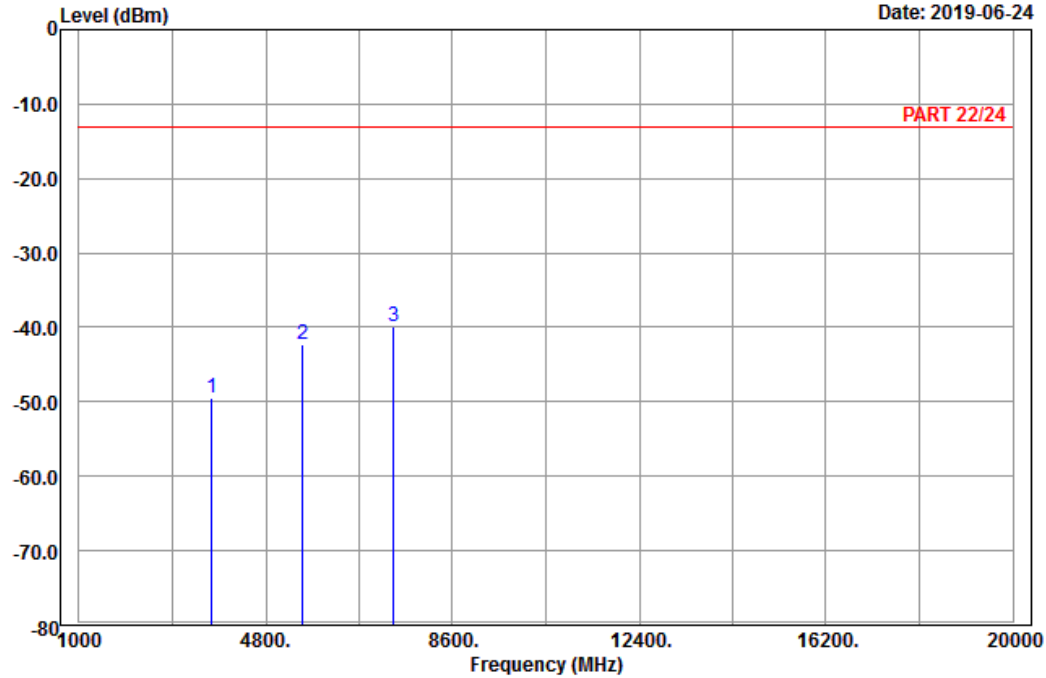


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18607
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3701.40	-49.49	-65.37	15.88	-13.00	-36.49	Peak
2	5552.10	-42.35	-62.69	20.34	-13.00	-29.35	Peak
3 pp	7402.80	-39.94	-62.22	22.28	-13.00	-26.94	Peak

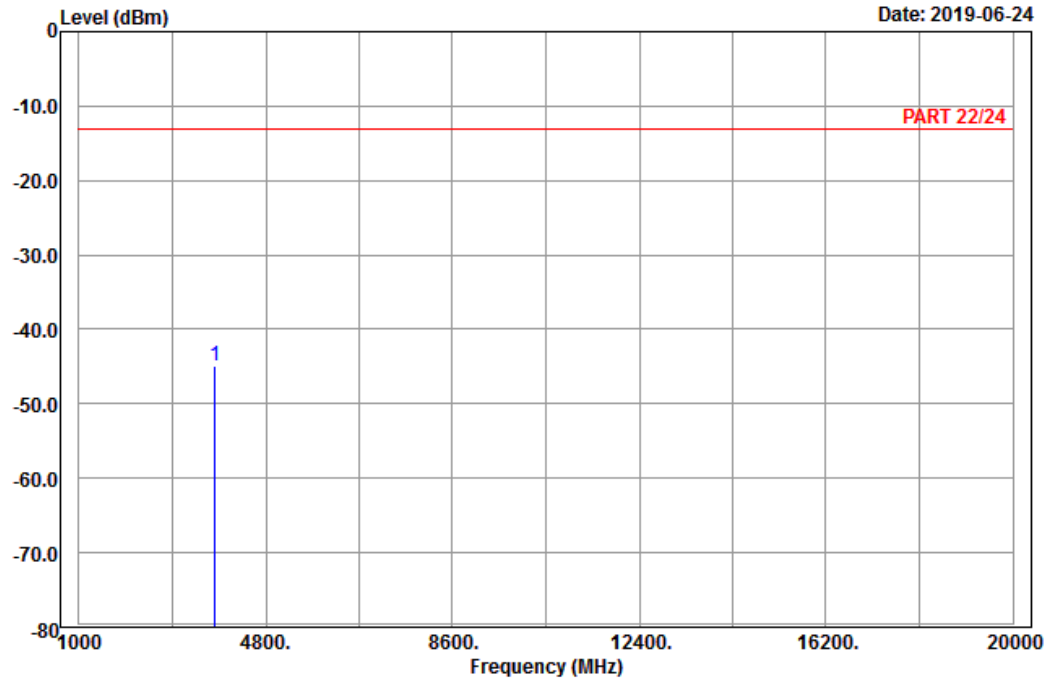
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : LTE_Band 2_Link_CH18900
 Tested by: Karl Lee

Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
MHz	dBm	dBm	dB	dBm	dB	
1 pp 3760.00	-45.00	-61.14	16.14	-13.00	-32.00	Peak

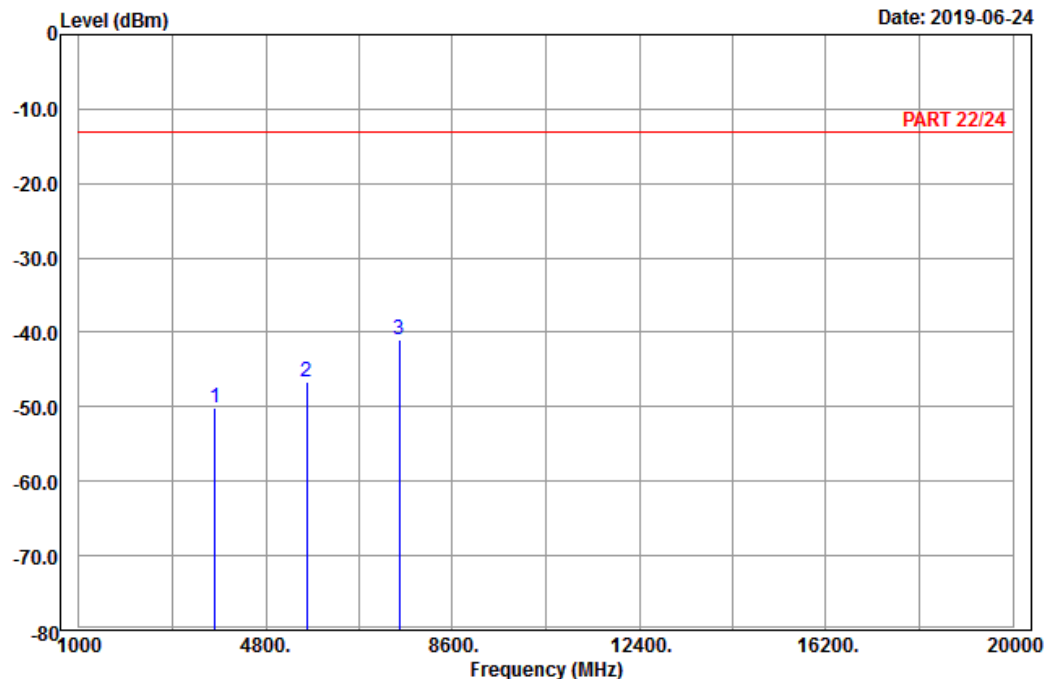


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18900
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3760.00	-50.22	-66.36	16.14	-13.00	-37.22	Peak
2	5640.00	-46.60	-67.07	20.47	-13.00	-33.60	Peak
3 pp	7520.00	-40.95	-63.63	22.68	-13.00	-27.95	Peak

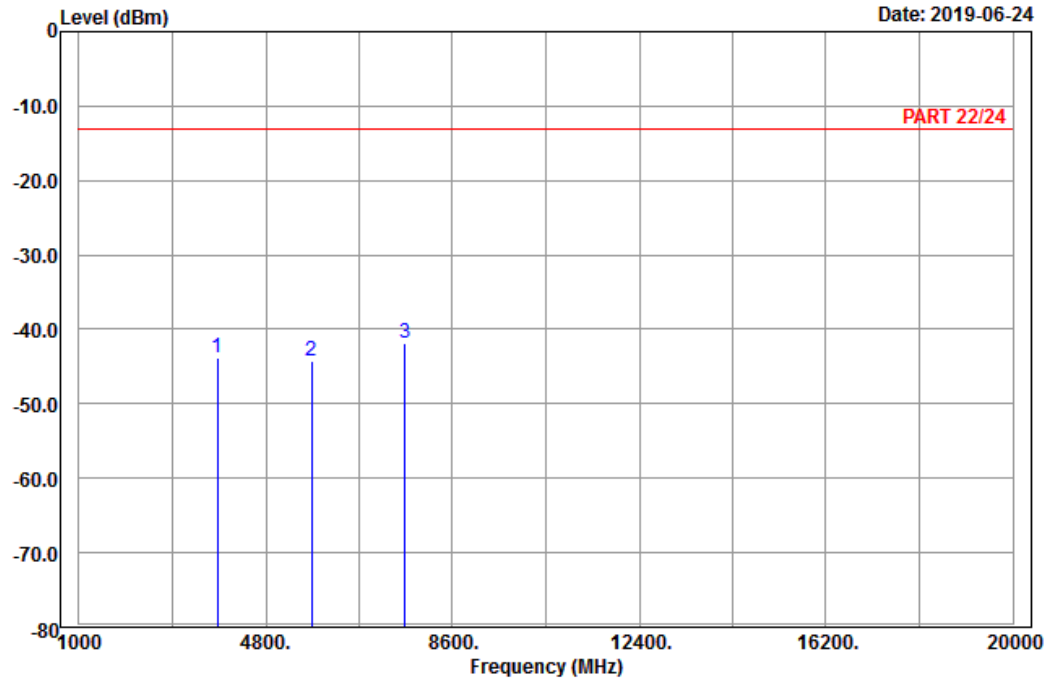
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : LTE_Band 2_Link_CH19193
 Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3818.60	-43.91	-60.41	16.50	-13.00	-30.91	Peak
2	5727.90	-44.24	-64.58	20.34	-13.00	-31.24	Peak
3 pp	7637.20	-41.80	-64.86	23.06	-13.00	-28.80	Peak

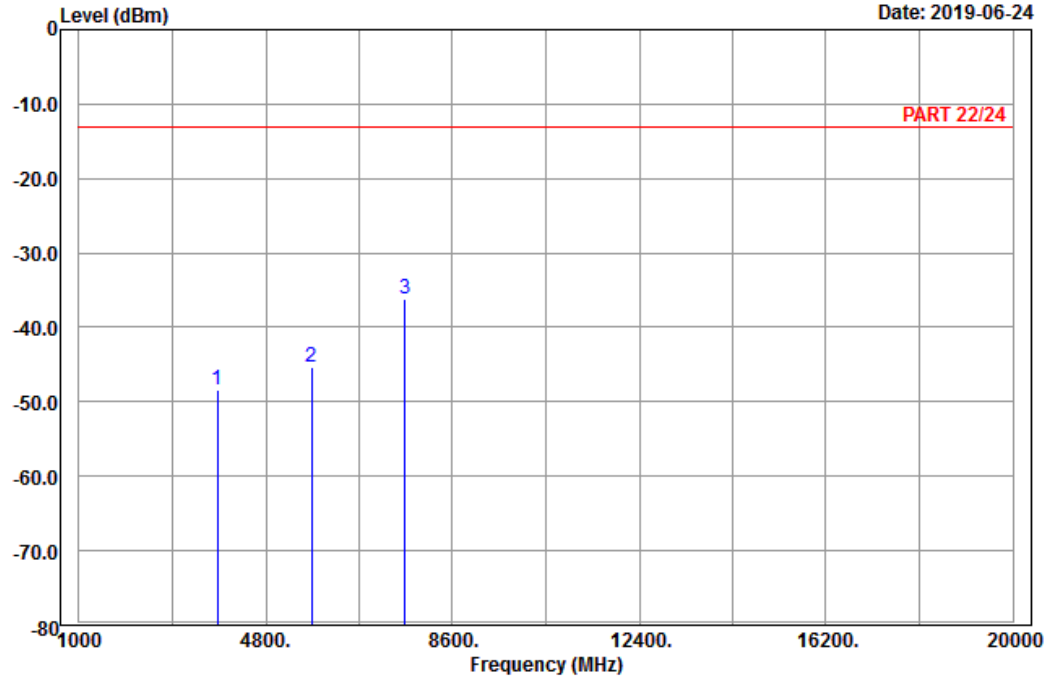


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH19193
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3818.60	-48.50	-65.00	16.50	-13.00	-35.50	Peak
2	5727.90	-45.28	-65.62	20.34	-13.00	-32.28	Peak
3 pp	7637.20	-36.18	-59.24	23.06	-13.00	-23.18	Peak

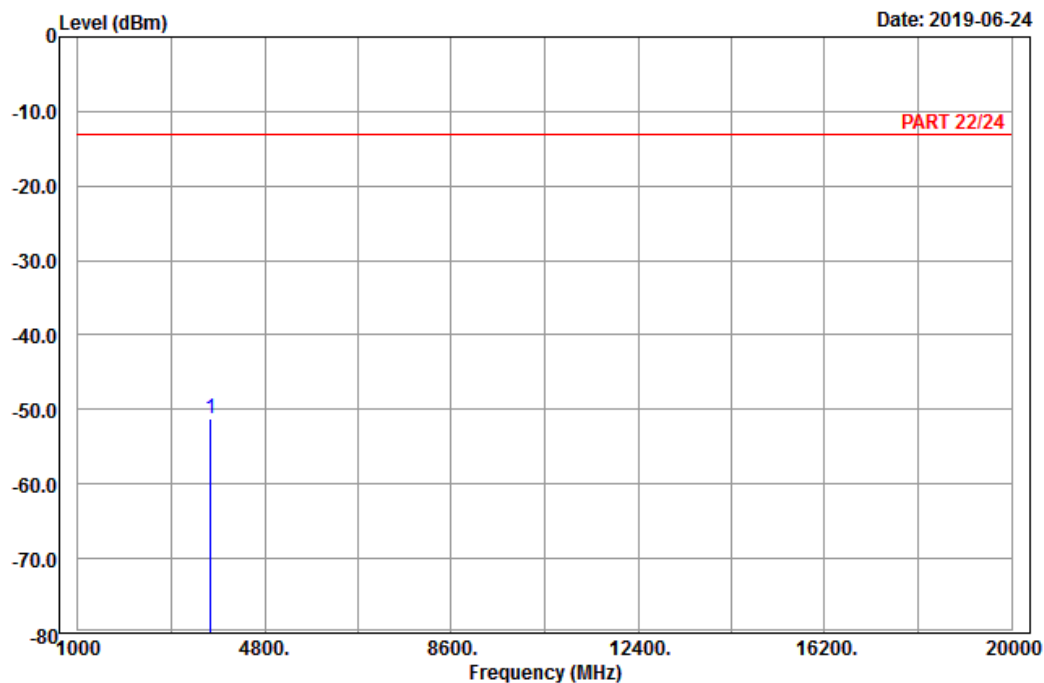
Channel Bandwidth: 5 MHz / QPSK
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18625
Tested by: Karl Lee

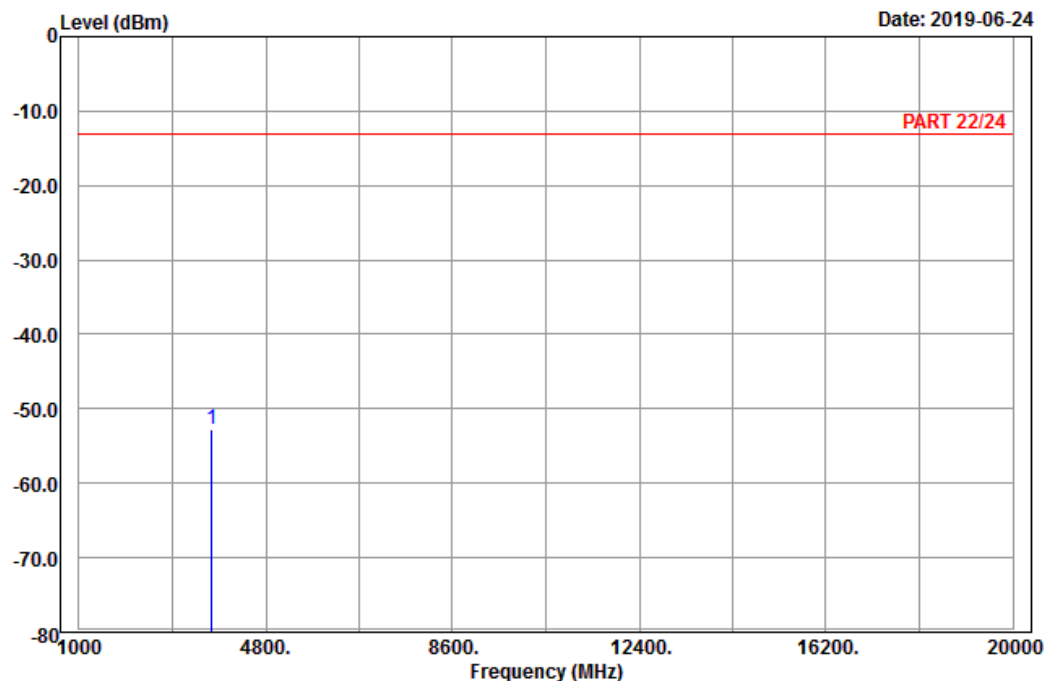
	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1 pp	3705.00	-51.14	-67.02	15.88	-13.00	-38.14	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10



Site : 966 chamber 1
 Condition: PART 22/24 Vertical
 Remark : LTE_Band 2_Link_CH18625
 Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1 pp	3705.00	-52.77	-68.65	15.88	-13.00	-39.77	Peak

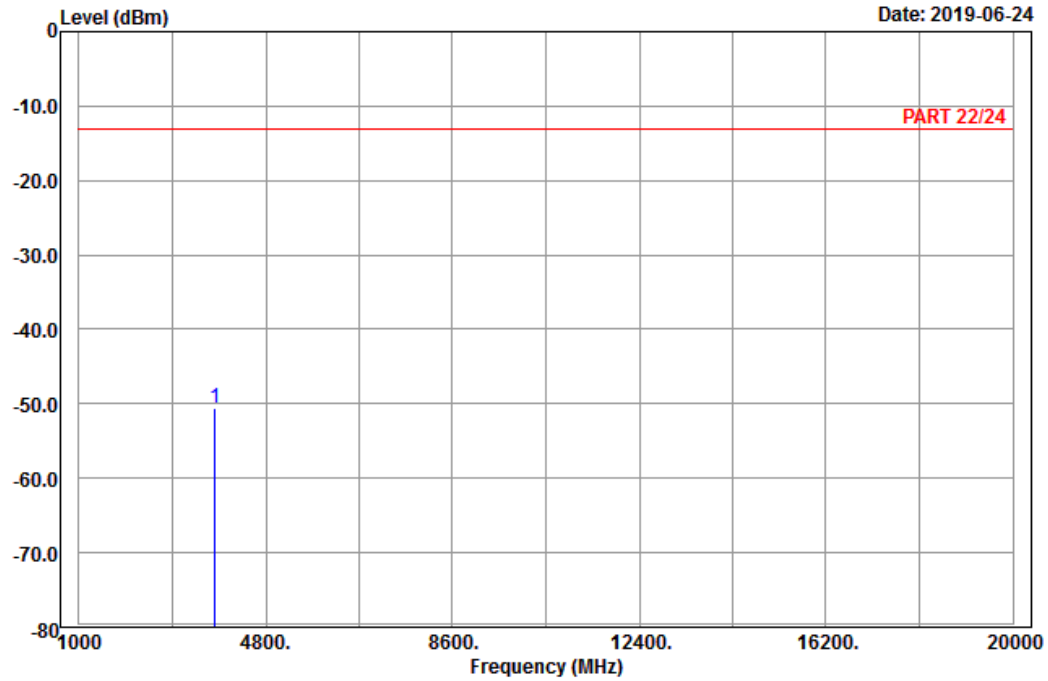
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : LTE_Band 2_Link_CH18900
 Tested by: Karl Lee

Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
MHz	dBm	dBm	dB	dBm	dB	
1 pp 3760.00	-50.53	-66.67	16.14	-13.00	-37.53	Peak

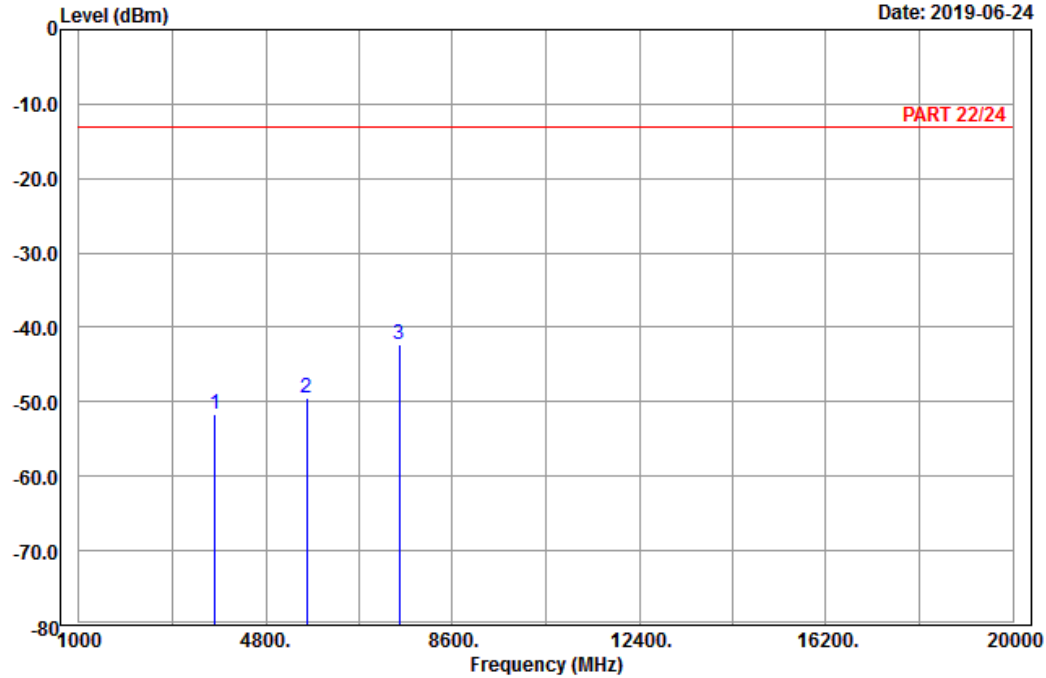


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18900
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3760.00	-51.76	-67.90	16.14	-13.00	-38.76	Peak
2	5640.00	-49.49	-69.96	20.47	-13.00	-36.49	Peak
3 pp	7520.00	-42.35	-65.03	22.68	-13.00	-29.35	Peak

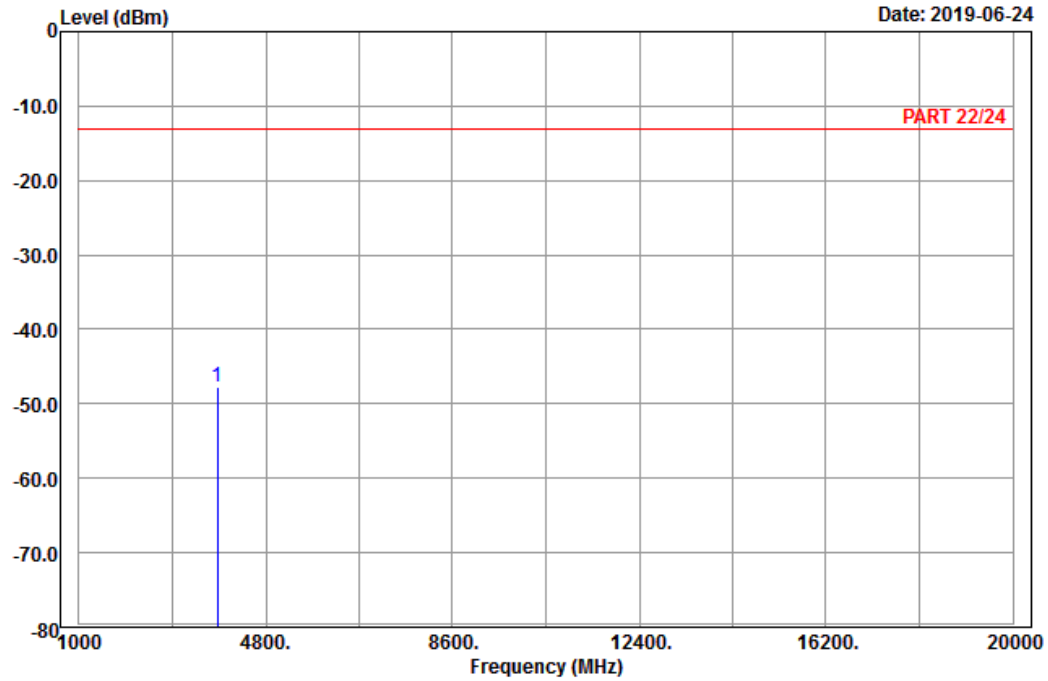
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : LTE_Band 2_Link_CH19175
 Tested by: Karl Lee

		Read		Limit	Over	
Freq	Level	Level	Factor	Line	Limit	Remark
MHz	dBm	dBm	dB	dBm	dB	
1 pp 3815.00	-47.63	-64.04	16.41	-13.00	-34.63	Peak

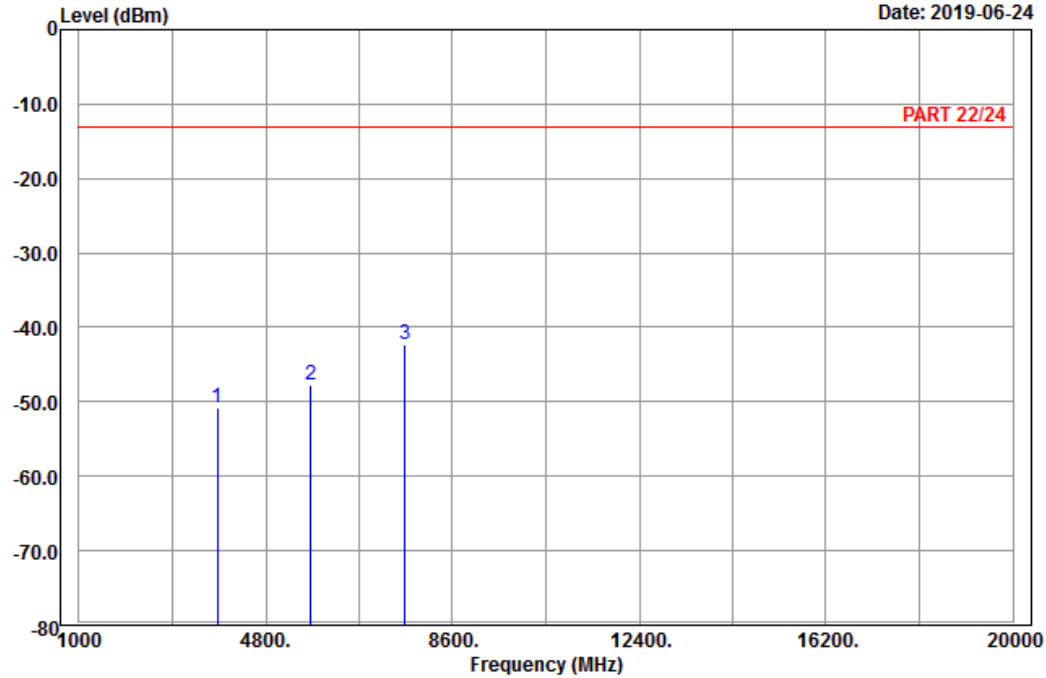


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH19175
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3815.00	-50.69	-67.10	16.41	-13.00	-37.69	Peak
2	5722.50	-47.69	-67.96	20.27	-13.00	-34.69	Peak
3 pp	7630.00	-42.34	-65.36	23.02	-13.00	-29.34	Peak

Channel Bandwidth: 20 MHz / QPSK
Low Channel

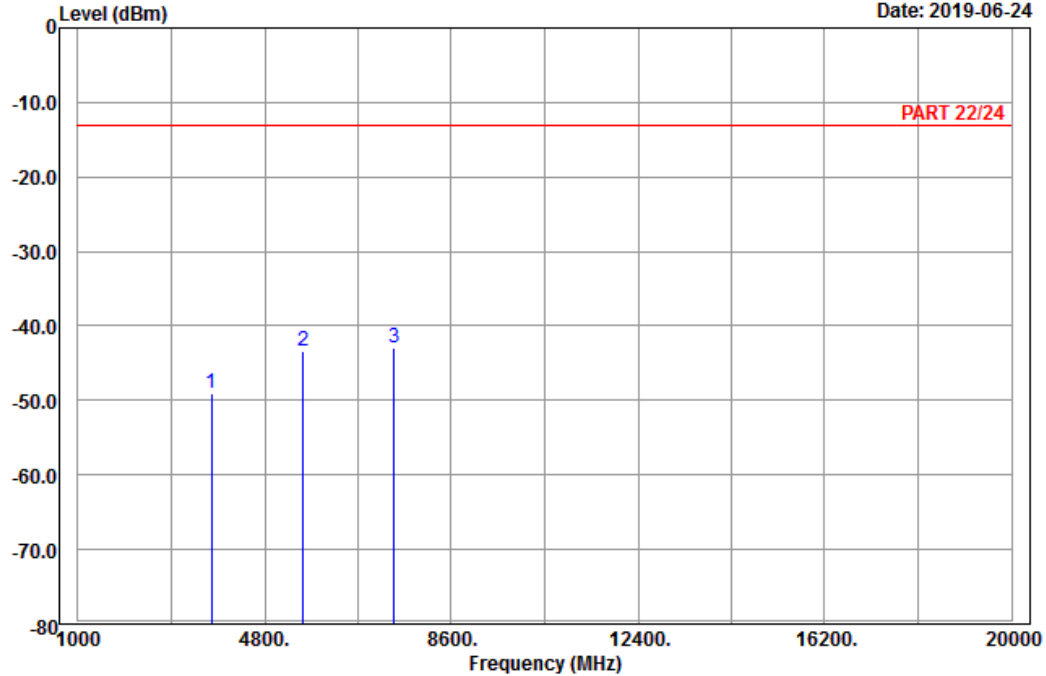


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18700
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3720.00	-49.12	-65.09	15.97	-13.00	-36.12	Peak
2	5580.00	-43.45	-63.82	20.37	-13.00	-30.45	Peak
3 pp	7440.00	-42.92	-65.17	22.25	-13.00	-29.92	Peak

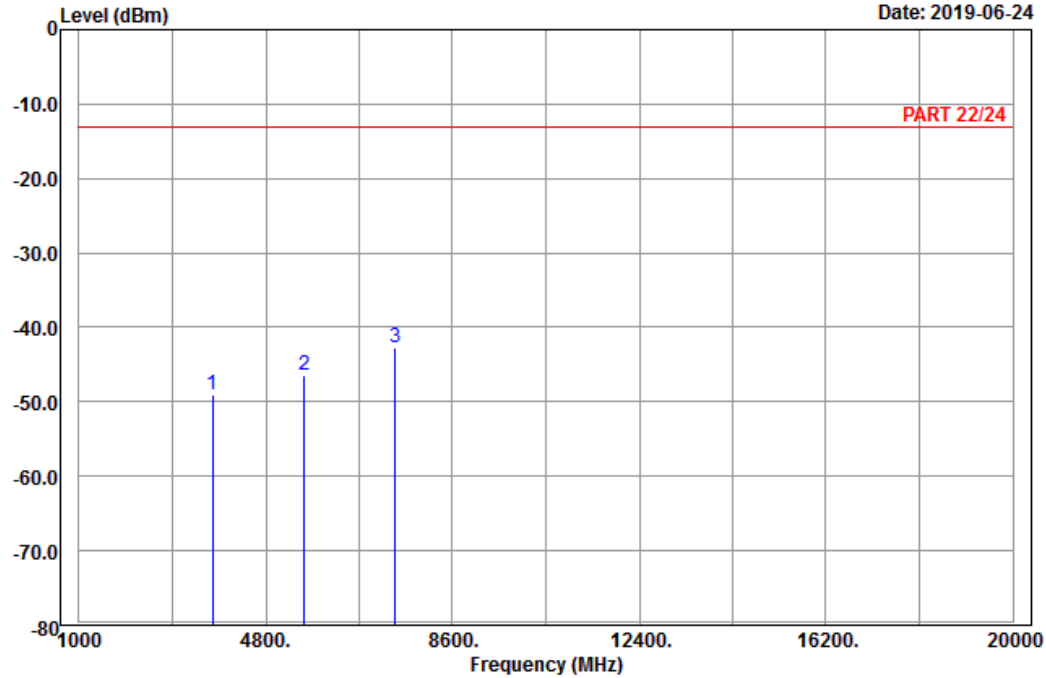


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18700
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3720.00	-49.12	-65.09	15.97	-13.00	-36.12	Peak
2	5580.00	-46.54	-66.91	20.37	-13.00	-33.54	Peak
3 pp	7440.00	-42.74	-64.99	22.25	-13.00	-29.74	Peak

Middle Channel

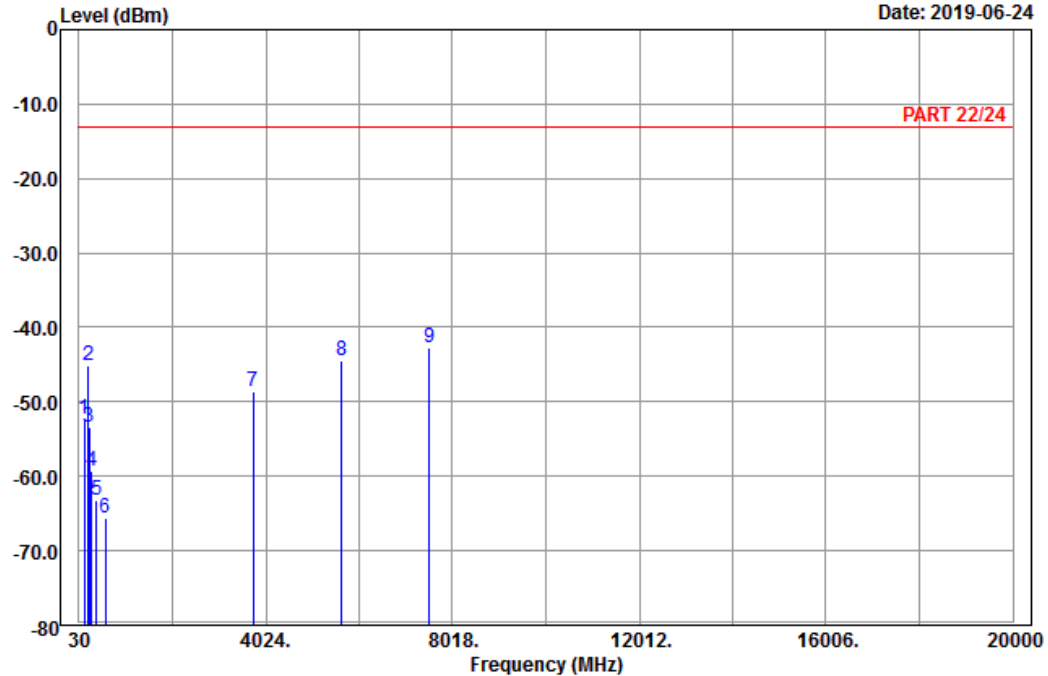


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 13

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18900
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	145.83	-52.22	-44.39	-7.83	-13.00	-39.22	Peak
2	223.59	-45.17	-39.31	-5.86	-13.00	-32.17	Peak
3	245.73	-53.41	-47.84	-5.57	-13.00	-40.41	Peak
4	301.40	-59.28	-53.34	-5.94	-13.00	-46.28	Peak
5	411.30	-63.15	-60.15	-3.00	-13.00	-50.15	Peak
6	600.30	-65.72	-66.15	0.43	-13.00	-52.72	Peak
7	3760.00	-48.71	-64.85	16.14	-13.00	-35.71	Peak
8	5640.00	-44.56	-65.03	20.47	-13.00	-31.56	Peak
9 pp	7520.00	-42.82	-65.50	22.68	-13.00	-29.82	Peak

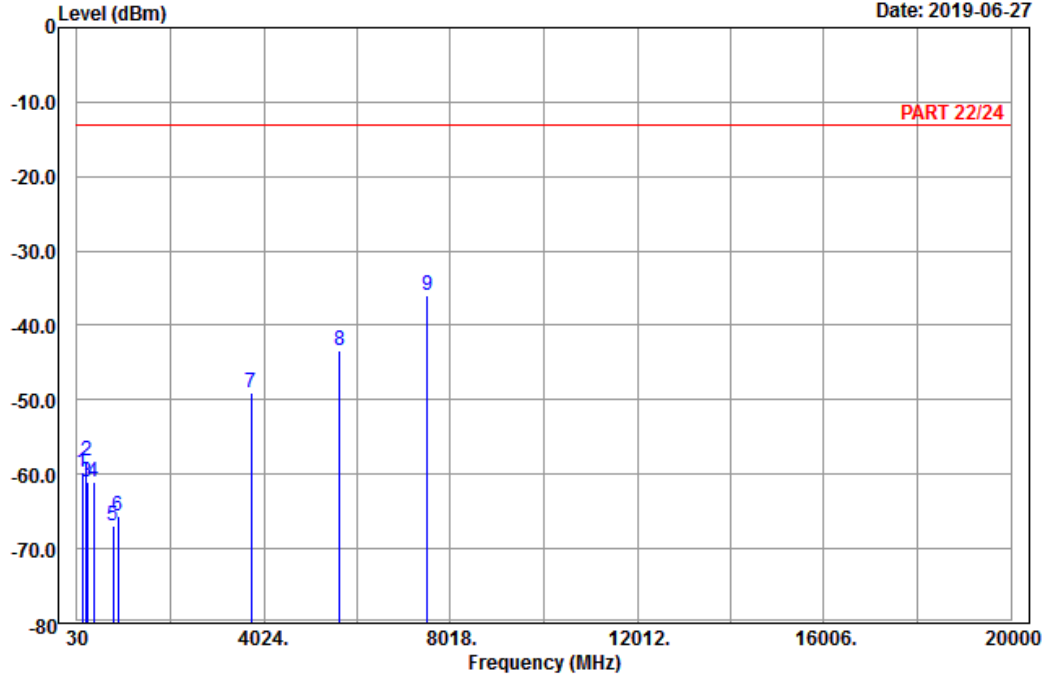


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 14

Date: 2019-06-27



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18900
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	149.07	-59.68	-51.75	-7.93	-13.00	-46.68	Peak
2	227.10	-58.24	-52.42	-5.82	-13.00	-45.24	Peak
3	255.45	-60.97	-55.42	-5.55	-13.00	-47.97	Peak
4	388.20	-61.04	-57.68	-3.36	-13.00	-48.04	Peak
5	810.30	-67.01	-68.91	1.90	-13.00	-54.01	Peak
6	899.90	-65.68	-68.57	2.89	-13.00	-52.68	Peak
7	3760.00	-49.14	-65.28	16.14	-13.00	-36.14	Peak
8	5640.00	-43.48	-63.95	20.47	-13.00	-30.48	Peak
9 pp	7520.00	-35.96	-58.64	22.68	-13.00	-22.96	Peak

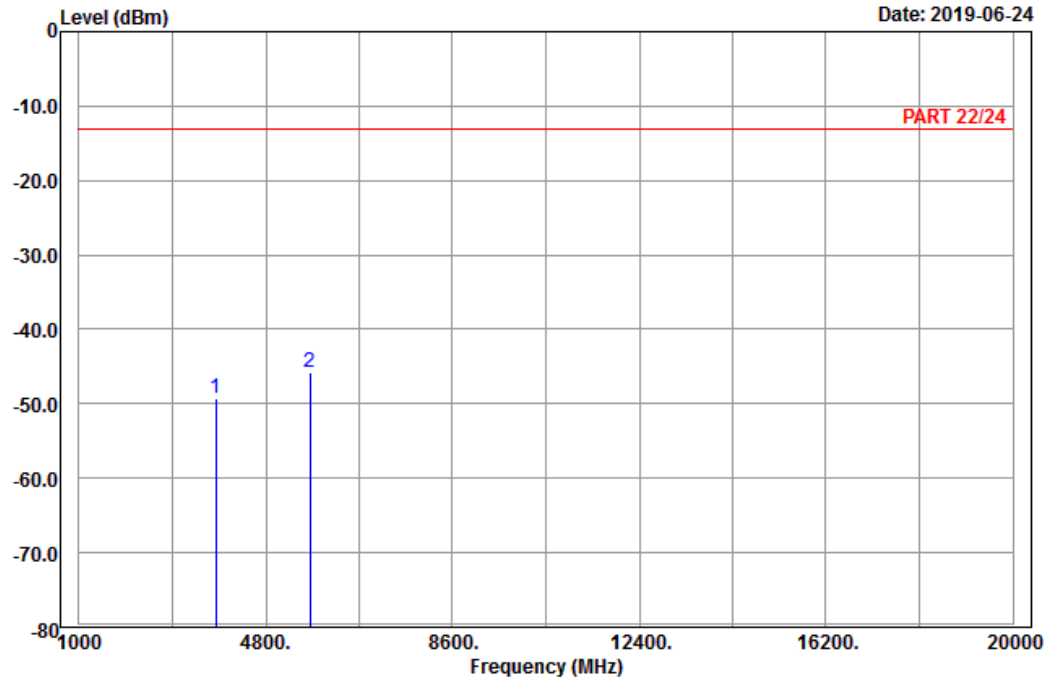
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : LTE_Band 2_Link_CH19100
 Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3788.00	-49.22	-65.54	16.32	-13.00	-36.22	Peak
2 pp	5700.00	-45.70	-65.91	20.21	-13.00	-32.70	Peak

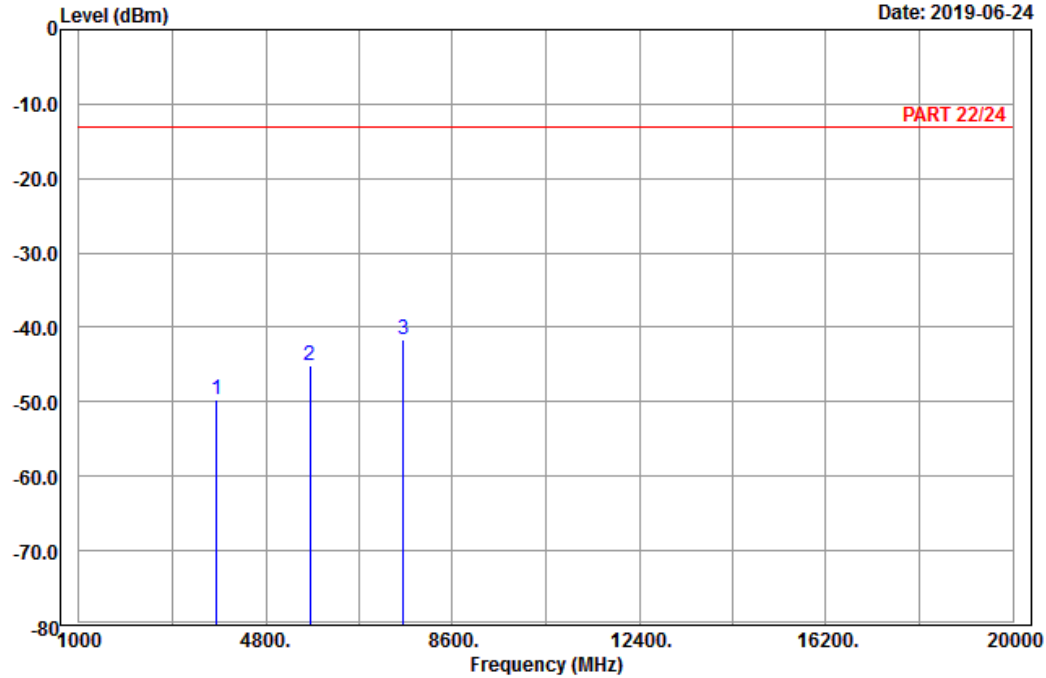


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH19100
Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3800.00	-49.80	-66.21	16.41	-13.00	-36.80	Peak
2	5700.00	-45.04	-65.25	20.21	-13.00	-32.04	Peak
3 pp	7600.00	-41.54	-64.53	22.99	-13.00	-28.54	Peak

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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Tel: 886-3-3183232

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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